TOOELE ARMY DEPOT
TOOELE, UTAH

SWMU 2/INDUSTRIAL WASTE LAGOON GROUNDWATER TREATMENT PLANT INFLUENT, EFFLUENT, AND EXTRACTION WELL SAMPLING QUARTERLY REPORT

July 2005

Contract No. DACA05-D-0012 Task Order CM 22
Project No. 1970991.01010401

Prepared for:

U.S. Army Corps of Engineers
Sacramento District
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LIST OF ACRONYMS

CDQMP	Chemical Data Quality Management Plan
CESPK	United States Army Corps of Engineers - Sacramento District
EMAX	EMAX Laboratories, Inc.
IDW	investigation-derived waste
MS/MSD	matrix spike/matrix spike duplicate
MDL	method detection limit
ml	milliliter
MWH	MWH Americas, Inc.
NOT	non-operation test
ORP	oxidation-reduction potential
PRAC	Pre-placed Remedial Action Contract
QC	quality control
RCRA	Resource Conservation and Recovery Act
SOW	scope of work
SWMU	solid waste management unit
TEAD	Tooele Army Depot
USACE	United States Army Corps of Engineers
U.S. EPA	U.S. Environmental Protection Agency
USHWCB	Utah Solid and Hazardous Waste Control Board
VOA	volatile organic analysis
VOC	volatile organic compound

1.0 INTRODUCTION

1.0.0.1. This report presents a summary of groundwater monitoring activities performed on 11 and 12 May 2005 by MWH Americas, Inc. (MWH) at the Tooele Army Depot (TEAD) groundwater treatment system. The groundwater samples were collected from eight operating extraction wells and from the groundwater treatment system influent and effluent in accordance with the *Final SWMU 2/Industrial Waste Lagoon System Non-Operation Test Monitoring and Installation-Wide Groundwater Monitoring Plans* (MWH, 2004) and the *Chemical Data Quality Management Plan – Tooele Army Depot* (CDQMP; U.S. Army Corps of Engineers, 2004).

1.0.0.2. The work summarized in this report was performed pursuant to the U.S. Army Corps of Engineers, Sacramento District (CESPK), Scope of Work (SOW) dated 5 September 2003 (revised 6 August 2004), and was performed under the Pre-placed Remedial Action Contract (PRAC) No. DACA05-99-D-0012, Task Order No. CM22.

1.1 BACKGROUND

1.1.0.1. The Utah Solid and Hazardous Waste Control Board (USHWCB) has issued TEAD a Resource Conservation and Recovery Act (RCRA) Post Closure Permit for post-closure and corrective action of the Industrial Waste Lagoon and other Solid Waste Management Units (SWMUs), hereafter referred to as the Permit (USHWCB, 2001). The groundwater monitoring activities described in this summary report were conducted to comply with the quarterly monitoring requirements described in Module V.D.1.e of the Permit, which requires TEAD to sample groundwater as it enters and exits the groundwater treatment system, and from every active extraction well.

1.2 DOCUMENT ORGANIZATION

1.2.0.1. The remainder of this report consists of:

- **Section 2.0 Equipment and Procedures.** Describes the equipment and procedures used to collect the groundwater samples.

- **Section 3.0 Analytical Results.** Presents the laboratory analytical results of the groundwater samples collected on 11 and 12 May 2005.

- **Appendix A Field Forms.** Includes copies of the Sample Log Forms and Chain-of-Custody Forms

- **Appendix B Quality Control Summary Report.** Presents the results of the verification and validation of analytical data for the groundwater samples collected on 11 and 12 May 2005.

2.0 SAMPLING EQUIPMENT AND PROCEDURES

2.0.0.1. This section presents a summary of the equipment and procedures used to collect groundwater samples at the TEAD groundwater treatment system on 11 and 12 August 2005 and includes: 1) field documentation procedures; 2) sample collection equipment and procedures; 3) sample labeling, chain-of-custody, handling and shipping procedures; and 4) procedures for handling the investigation-derived wastes (IDW).

2.1 FIELD DOCUMENTATION PROCEDURES

2.1.0.1. All pertinent sampling information was recorded on field forms including Sample Log Forms and Chain-of-Custody Forms. Information included on the Sample Log Form included weather conditions, sampling personnel, sample location, sample time, sample type, and the measured general water-quality parameters. Information included on the Chain-of-Custody Form included project identification, project location, sample designation, analysis type, sample collection date and time, and signatures of the persons relinquishing and receiving samples. The completed field forms for the 11 and 12 May 2005 sampling round are included in Appendix A.

2.2 EXTRACTION WELL AND TREATMENT SYSTEM INFLUENT AND EFFLUENT SAMPLING

2.2.1 Locations and Rationale

2.2.1.1. The extraction wells and treatment system influent and effluent were sampled in accordance with the quarterly monitoring requirements described in Module V.D.1.e of the Permit, which requires TEAD to sample groundwater as it enters and exits the groundwater treatment plant, and from every active extraction well. On 11 and 12 May 2005, eight groundwater extraction wells were operating and sampled. The eight groundwater extraction wells were operating in accordance with the *System Non-Operation Test Proposal, Implementation of Alternative Measures Industrial Waste Lagoon* (NOT Proposal; URS, 2003), and the approved changes to the NOT Proposal

described in Appendix D of the *Final SWMU 2/Industrial Waste Lagoon System Non-Operation Test Monitoring and Installation-Wide Groundwater Monitoring Plans* (MWH, 2004).

2.2.2 Equipment and Procedures

2.2.2.1. The discharge pipe at each extraction well-head and the influent and effluent pipes at the treatment system building are equipped with sample faucets. Prior to collecting each sample, the faucet was opened to allow a minimum of 0.5 gallon of water to purge the faucet. After the faucet was purged, the flow was reduced to approximately 100 milliliters (ml) per minute and the volatile organic analysis (VOA) sample containers were filled directly from the faucet.

2.2.2.2. The water samples were collected in pre-preserved 40-ml amber glass containers provided by the laboratory. The sample containers were labeled with the date, time, sample designation, project name and required analysis immediately prior to collecting the samples. The sample containers were filled so that there was no headspace and no air bubbles.

2.2.2.3. Immediately after sample collection, the sample containers were placed in an ice-packed cooler and maintained at 4 $\pm$2 °C. Sample labeling, chain-of-custody, and shipping procedures are described in Section 2.3.

2.2.2.4. After each sample was collected, additional water was retained from the faucet for general water-quality field measurements. A field-portable Quanta Water Quality Meter was used to measure pH, specific conductivity, temperature, turbidity, dissolved oxygen, and oxidation-reduction potential (ORP) of the sampled water. The water-quality meter was calibrated daily according to the manufacturer's instructions. All calibration information and water quality measurements was recorded on the Sampling Log Forms (refer to Appendix A).

2.2.3 Quality Control Sample Collection

2.2.3.1. Quality control (QC) samples were collected to validate the groundwater analytical data and field procedures. The QC samples that were collected included trip blank, blind duplicate, and matrix spike/matrix spike duplicate samples. A summary of the QC samples collected during the field program is presented on Table 2-1. The results of the QC samples and their impacts on the overall sample results are discussed in the Quality Control Summary Report contained in Appendix B. The procedures for collecting the required QC samples are discussed below. The QC samples were handled and shipped according to the procedures described in Section 2.3.

2.2.3.2. Trip Blank Samples. Trip blank samples consisted of a set of VOA bottles that were filled by the laboratory with reagent-grade water and accompanied the empty bottle sets to the site. The trip blanks remained unopened during the sampling activities and were handled with the environmental VOA samples during all the sampling activities. The trip blanks were returned to the laboratory in each cooler that contained VOA samples. Trip blanks were used to verify that samples were not contaminated by the sample containers or other samples during transfer to and from the laboratory. Two trip blank samples were submitted during the 11 and 12 May 2005 sampling activities.

2.2.3.3. Blind Duplicate Samples. A blind duplicate is a duplicate sample that is submitted with a fictional sample identification so that the laboratory is unaware the sample is a duplicate. Blind duplicate samples are used to assess the consistency and precision of the laboratory. The blind duplicate sample was collected by alternately filling the environmental sample containers and the blind duplicate sample containers as described in Section 2.2.2. One blind duplicate sample was collected during the 11 and 12 May 2005 sampling activities.

2.2.3.4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples. MS/MSD samples are duplicate samples submitted to the laboratory to measure the efficiency of the analytical method in recovering target analytes from an environmental matrix, as well as the laboratory precision and accuracy. The MS/MSD samples were collected by

alternately filling the environmental sample containers and the MS/MSD sample containers as described in Section 2.2.2. One MS/MSD sample pair was collected during the 11 and 12 May 2005 sampling activities.

2.3 SAMPLE LABELING, CHAIN-OF-CUSTODY, HANDLING AND SHIPPING

2.3.1 Sample Labeling

2.3.1.1. A label was placed on each sample container submitted for analysis and included the following information:

- Project name and location
- Sample designation
- Date and time of sample collection
- Preservative
- Sampler's initials
- Requested analyses.

2.3.2 Chain-of-Custody

2.3.2.1. A chain-of-custody form was completed and accompanied each sample cooler submitted to the laboratory. This form included project identification, project location, sample designation, and analysis type. In addition, there are spaces for entry of the sample collection date and time, signatures of the persons relinquishing and receiving samples, and the conditions of the samples upon receipt by the laboratory. The completed chain-of-custody forms are included in Appendix A.

2.3.3 Sample Handling and Shipping

2.3.3.1. After sample collection, each sample container was placed in a cooler that contained sufficient ice to maintain the samples at a temperature of 4 ±2 °C. Each sample was wrapped separately in "bubble-wrap". Ice was double-bagged in zip-lock bags prevent melt water from contacting the samples. The chain-of-custody record was placed inside a plastic bag, sealed, and placed inside the cooler. The cooler was taped shut with strapping tape and custody seals affixed to the outside of the cooler. All samples were shipped to the laboratory within 24 hours of sample collection via Federal Express priority service to ensure that the samples arrived at the laboratory in time to meet both analytical holding times and the project schedule.

2.4 INVESTIGATION-DERIVED WASTE HANDLING

2.4.0.1. The IDW generated during the 11 and 12 May 2005 sampling round included sample-faucet purge water and miscellaneous disposable sampling equipment (e.g., latex gloves, paper towels, plastic 5-gallon buckets). The water generated while purging the sample faucets was contained in plastic 5-gallon buckets and discharged to the sump that feeds the groundwater treatment plant. The miscellaneous sampling equipment was disposed of as municipal waste in the dumpster at the treatment plant.

TABLE 2-1

SUMMARY OF SAMPLES COLLECTED FROM THE TEAD GROUNDWATER TREATMENT SYSTEM INFLUENT, EFFLUENT, AND EXTRACTION WELLS ON 11 AND 12 MAY 2005

Sample Designation [(a)]	Sample Location/Rationale	Sample Type	Analytes	Method
EXTRACTION WELL GROUNDWATER SAMPLES				
TEAD-05-05-E01-WF	Extraction well E-01. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B
TEAD-05-05-E02.1-WF	Extraction well E-02-01. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B
TEAD-05-05-E02.2-WF	Extraction well E-02-02. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B
TEAD-05-05-S-E02.2-WF	TEAD-05-05-E02.2-WF Duplicate Sample	QC (Blind Duplicate)	VOCs	EPA Method 8260B
TEAD-05-05-E11-WF	Extraction well E-11. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B
TEAD-05-05-E12-WF	Extraction well E-12. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B
TEAD-05-05-E12-WF-MS	TEAD-05-05-E12-WF Duplicate sample.	QC (Matrix Spike)	VOCs	EPA Method 8260B
TEAD-05-05-E12-WF-MSD	TEAD-05-05-E12-WF Duplicate sample.	QC (Matrix Spike Duplicate)	VOCs	EPA Method 8260B
TEAD-05-05-E13-WF	Extraction well E-13. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B
TEAD-05-05-E14-WF	Extraction well E-14. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B

Shading indicates where quality control (QC) samples were collected.

(a) Sample Designation:

WF – Well-head faucet
TEAD – Tooele Army Depot
MS/MSD – Matrix Spike/Matrix Spike Duplicate
INF – Influent
EFF - Effluent
TB – Trip Blank
VOC – Volatile organic compound

TABLE 2-1

SUMMARY OF SAMPLES COLLECTED FROM THE TEAD GROUNDWATER TREATMENT SYSTEM INFLUENT, EFFLUENT, AND EXTRACTION WELLS ON 11 AND 12 MAY 2005

Sample Designation [(a)]	Sample Location/Rationale	Sample Type	Analytes	Method
EXTRACTION WELL GROUNDWATER SAMPLES (continued)				
TEAD-05-05-E15-WF	Extraction well E-15. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B
TREATMENT PLANT INFLUENT AND EFFLUENT SAMPLES				
TEAD-05-05-INF-WF	Groundwater treatment plant influent. Establish VOC concentrations in water entering treatment plant.	Environmental	VOCs	EPA Method 8260B
TEAD-05-05-EFF-WF	Groundwater treatment plant effluent. Establish VOC concentrations in water exiting treatment plant.	Environmental	VOCs	EPA Method 8260B
ADDITIONAL QUALITY CONTROL SAMPLES				
TEAD-8-3-04-TB01	Trip Blank sample	QC (Trip Blank)	VOCs	EPA Method 8260B

Shading indicates where quality control (QC) samples were collected.

(a) Sample Designation:

WF – Well-head faucet
TB – Trip Blank
TEAD – Tooele Army Depot
VOC – Volatile organic compound
MS/MSD – Matrix Spike/Matrix Spike Duplicate
INF – Influent
EFF - Effluent

3.0 ANALYTICAL RESULTS

3.0.0.1. This section presents the laboratory analytical results for the TEAD groundwater treatment plant influent, effluent, and extraction well samples collected on 11 and 12 May 2005. The groundwater sample analytical results are summarized in Table 3-1, which includes all analytes detected above their respective analytical method detection limits (MDLs). All of the analytical data including non-detections and all QC sample results are provided in Table B-1 located in the Quality Control Summary Report (Appendix B of this report).

3.1 EVALUATION OF ANALYTICAL DATA

3.1.1 Analytical Laboratory and Quality Assurance Plan

3.1.1.1. All analyses for the water samples collected on 11 and 12 May 2005 were performed by EMAX Laboratories, Inc. (EMAX), a State of Utah certified and U.S. Army Corps of Engineers (USACE) approved laboratory. EMAX conformed to the analytical method requirements, analytical quality control requirements, and instrument calibration frequency specified in the *Chemical Data Quality Management Plan (CDQMP) Tooele Army Depot* (USACE, 2004).

3.1.2 Selection of Analytical Methods

3.1.2.1. The water samples collected on 11 and 12 May 2005 were analyzed for the volatile organic compounds (VOCs) listed in Table V-2 of the TEAD Post-Closure Permit by U.S. Environmental Protection Agency (U.S. EPA) Method 8260B. The complete constituent lists for the VOC analyses are presented in Table B-1 located in the Quality Control Summary Report (Appendix B of this report).

3.1.3 Validation of Analytical Data

3.1.3.1. The laboratory provided the analytical results in both electronic and "hard copy" versions. The project chemist reviewed the analytical results to determine if they were

valid. During the data validation review, the chemist looked at each analyte detected to evaluate if its presence was attributable to environmental conditions, or if it was the result of field or laboratory procedures. Sample results that were affected by either field or laboratory procedures were qualified by the chemist. All data qualifiers, as well as the rationale for using the qualifier, are discussed in the Quality Control Summary Report (located in Appendix B).

3.2 SUMMARY OF ANALYTICAL RESULTS

3.2.0.1. A summary of the detected analytes is presented on Table 3-1. VOCs were detected in the groundwater sampled from each of the eight sampled extraction wells except extraction well E-12. VOCs also were detected in the treatment plant influent sample. No VOCs were detected in the groundwater sampled from extraction well E-12 and no VOCs were detected in the treatment plant effluent. All of the analytical data including non-detections and all QC sample results are provided in Table B-1 located in the Quality Control Summary Report (Appendix B of this report).

TABLE 3-1

SUMMARY OF ANALYTES DETECTED IN TEAD GROUNDWATER TREATMENT PLANT INFLUENT, EFFLUENT, AND EXTRACTION WELL SAMPLES COLLECTED MAY 2005

Location Identification	E-01	E-02-1	E-02-2	E-02-2 Dup
Field Sample Identification	TEAD-05-05-E1-WF	TEAD-11-05-05-E2.1-WF	TEAD-11-05-05-E2-2-WF	TEAD-11-05-05-S-E2-2-WF
Analyte/Methods (Units) **Date Collected**	**5/12/2005**	**5/11/2005**	**5/11/2005**	**5/11/2005**
Volatile Organic Compounds/SW8260B (µg/l)				
1,1-Dichloroethane	**0.53 T**	<1.0	**0.22 T**	<1.0
Carbon tetrachloride	**0.96 T**	<1.0	**0.58 T**	**0.49 T**
Trichloroethene (TCE)	**21**	**13**	**18**	**17**

µg/l micrograms per liter.
Bold Bolded result indicates positively identified compound.
J Data are estimated due to associated quality control data.
T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.

TABLE 3-1

SUMMARY OF ANALYTES DETECTED IN TEAD GROUNDWATER TREATMENT PLANT INFLUENT, EFFLUENT, AND EXTRACTION WELL SAMPLES COLLECTED MAY 2005

Location Identification	E-11	E-12	E-13	E-14
Field Sample Identification	TEAD-05-05-E11-WF	TEAD-11-05-05-E12-WF	TEAD-05-05-E13-WF	TEAD-05-05-E14-WF
Analyte/Methods (Units) **Date Collected**	**5/12/2005**	**5/11/2005**	**5/12/2005**	**5/12/2005**
Volatile Organic Compounds/SW8260B (µg/l)				
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	<1.0	<1.0	<1.0	<1.0
Trichloroethene (TCE)	**8.0**	<1.0	**3.1**	**18**

µg/l micrograms per liter.
Bold Bolded result indicates positively identified compound.
J Data are estimated due to associated quality control data.
T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.

TABLE 3-1

SUMMARY OF ANALYTES DETECTED IN TEAD GROUNDWATER TREATMENT PLANT INFLUENT, EFFLUENT, AND EXTRACTION WELL SAMPLES COLLECTED MAY 2005

Location Identification Field Sample Identification Analyte/Methods (Units) Date Collected	E-15 TEAD-05-05-E15-WF 5/12/2005	EFF TEAD-05-05-EFF-WF 5/12/2005	INF TEAD-05-05-INF-WF 5/12/2005
Volatile Organic Compounds/SW8260B (µg/l)			
1,1-Dichloroethane	<1.0	<1.0	<1.0
Carbon tetrachloride	<1.0	<1.0	<1.0
Trichloroethene (TCE)	**1.6**	<1.0	**6.2 J**

µg/l micrograms per liter.
Bold Bolded result indicates positively identified compound.
J Data are estimated due to associated quality control data.
T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.

REFERENCES

MWH Americas, Inc., 2004. *Tooele Army Depot, SWMU 2/Industrial Waste Lagoon System Non-Operation Test Monitoring and Installation-Wide Groundwater Monitoring Plans*. Prepared for the U.S. Army Corps of Engineers – Sacramento District. Final, June 2004.

URS, 2003. *Final System Non-Operation Test Proposal, Implementation of Alternative Measures, Industrial Waste Lagoon*. Prepared for the U.S. Army Corps of Engineers – Sacramento District. Final, October 2003.

U.S. Army Corps of Engineers, 1999. *Chemical Data Quality Management Plan (CDQMP) Tooele Army Depot*. Prepared for Tooele Army Depot SIOTE-CO-EO, Final Revision 2.

Utah Department of Environmental Quality Division of Solid and Hazardous Waste, 2001. *Tooele Army Depot Post-Closure Permit*. U.S. EPA Identification Number UT 3213820894. February 12, 2001. World-Wide Web link http://www.hazardouswaste.utah.gov/TEAD.htm

APPENDIX A

FIELD LOG FORMS

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

LABORATORY EMAX

Chain of Custody ID B
Cooler ID 110505DA01
Page 1 of 2
Air Bill No. 849757583957

MWH
Phone (801) 617-3200 FAX (801) 617-4200
MWH Contact Craig Moore
Project TEAD
Project Number 197099I.0101402
Date Due STANDARD
Samplers Signature Dennis Adams

Lab ID No. (Lab Only)	Location ID	Field Sample ID	Depth Interval (ft)	Date Collected	Time Collected	Sample Number	Matrix[a]	Sampling Technique[b]	ANALYSES REQUESTED: VOCs 8260B	Trace Metals (filtered) 6010B/7000	Explosives (8330)	Trip Blank
	TEAD-11-05-05-TB-01			5/11/05	1000	1	WQ	G	X			
	TEAD-05-05-C26-DF-364			5/11/05	1015	2	WG	DF	X			
	TEAD-05-05-C33-DF-369			5/11/05	1040	3	"	"	X			
	TEAD-05-05-C39-DF-447			5/11/05	1200	4	"	"	X			
	TEAD-05-05-S-C39-D-DF-447			5/11/05	1230	5	"	"	X			
	TEAD-05-05-C20-DF-364			5/11/05	1250	6	"	"	X			
	TEAD-05-05-C17-DF-357			5/11/05	1315	7	"	"	X			
	TEAD-05-05-E2-2-WF			5/11/05	1410	8	"	DF	X			
	TEAD-05-05-S-E2-2-WF			5/11/05	1430	9	"	"	X			
	TEAD-05-05-E2.1-WF			5/11/05	1440	10	"	"	X			
	TEAD-05-05-E12-WF			5/11/05	1500	11	"	"	X			
	TEAD-05-05-E12-WF-MS			5/11/05	1500	12	"	"	X			
	TEAD-05-05-E12-WF-MSD			5/11/05	1500	13	"	"	X			

[a] Matrix:
SO - Soil
SE - Sediment
WS - Surface Water
WG - Ground Water
LF - Product
AA - Air
SW - Wipe
EP/TCLP Leachate
WQ - Trip Blank,
EB - Equipment Blanks
WW - Wastewater

[b] Sampling Technique:
Composite=C
Grab=G
Hand Auger=HA
Passive Diffusion Bag=DF
Bladder Pump=BP
Submersible Pump=SP
Bailer=B
Well-Head Faucet=WF

SPECIAL INSTRUCTIONS:

Relinquished by/Affiliation	Received by/Affiliation	Date	Time
Dennis Adams/MWH	Fedex	5/11/05	1650

Relinquished by/Affiliation	Received by/Affiliation	Date	Time

LABORATORY USE ONLY

SAMPLES WERE:
1 Shipped or hand delivered
Notes:
2 Ambient or Chilled
Notes:
3 Temperature _____
4 Received Broken/Leaking (Improperly Sealed)
Y N
Notes:
5 Properly Preserved
Y N
Notes:
6 Received Within Holding Times
Y N
Notes:

COC Tape Was:
1 Present on Outer Package
Y N NA
2 Unbroken on Outer Package
Y N NA
3 Present on Sample
Y N NA
4 Unbroken on Sample
Y N NA
Notes:

Discrepancies Between Sample Labels and COC Record?
Y N
Notes:

GROUND-WATER/SURFACE WATER SAMPLING LOG

Project No: 1070991.01010402 Sample Location TEADN Suface Water ____ Groundwater X

Sampling Personnel: Dennis Adams/David Imlay Date: 6-11-05 Start Time 1400 Finish Time 1420

DTW ~~0~~ DTP ~~0~~ Product Thickness ____ Measuring Point ____

Borehole Dia. ____ Total Casing Depth ____ Purge Volume ____ gallons Weather Cloudy, Rain, wind

Sampling Method: Dedicated Submersible Pump ____ ~~Water Pump~~ Cabrio ✓ PDB ____

Dedicated Bladder Pump ____ Portable Bladder Pump ____ Surge/Bail ____ Surge Block Type ____

Disposable Bailer ____ Grab ____ Other ____

Pump Started ____ Pump Stopped ____ Total Gallons ____ Organic Vavopr at Wellhead ____

Parameters Taken

Time (military)	Temp (C)	SC (umhos/cm)	D.O. (mg/L)	pH	EH-ORP (millivolts)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1408	18.93	2450	4.11	7.13	-185	5.9	✓	—	—

Final

Time (military)	pH	SC (umhos/cm)	Temp (C)	EH-ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1408	~~4.93~~ 7.13	2450	~~4.11~~ 18.93	-185	4.11	5.9	—	—	—

Comments ____

Instrumentaion: Quanta ✓ Hydrolab Datasonde4 ____ Horiba U22 ____ Other ____

Calibration: ph Buffers 7/10 Eh Reference QH/pH SC Reference: 1413 umhos

Turbidity Reference Solution 0 NTU's

Sample ID: TEAD-05-05-E2-2-WF **Sample Collection Time:** 1410

Samples Collected: VOC's 8260B ✓ Sulfide ____ TOC ____ Cations ____

Trace metals ____ SVOC's ____ Explosives ____ TPH Gas ____ Dioxins ____

Perchlorate ____ Anions/Alkalinity/TDS ____ BTEXN ____ TPH Diesel ____

TSS ____ Bicarbonates ____ Nitrates/Nitites ____ Sulfites ____

MS/MSD ____ BD: 1430 ____ TB called: ____ ____

TEAD-05-05-5-E2-2-WF

GROUND-WATER/SURFACE WATER SAMPLING LOG

Project No: 1970991.010104 02 Sample Location TEADN Suface Water ____ Groundwater X

Sampling Personnel: Dennis Adams/David Imlay Date: 5-11-05 Start Time 1430 Finish Time 1445

DTW — DTP 0 Product Thickness 0 Measuring Point 0

Borehole Dia. ____ Total Casing Depth ____ Purge Volume ____ gallons Weather Windy, Rain, Cloudy

Sampling Method: Dedicated Submersible Pump ____ WF ~~Gabis~~ ✓ PDB ____

Dedicated Bladder Pump ____ Portable Bladder Pump ____ Surge/Bail ____ Surge Block Type ____

Disposable Bailer ____ Grab ____ Other ____

Pump Started ____ Pump Stopped ____ Total Gallons ____ Organic Vavopr at Wellhead ____

Parameters Taken

Time (military)	Temp (C)	SC (umhos/cm)	D.O. (mg/L)	pH	EH-ORP (millivolts)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1435	18.13	1730	5.54	7.46	-207	2.2	—	—	—

Final

Time (military)	pH	SC (umhos/cm)	Temp (C)	EH-ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1435	7.46	1730	18.13	-207	5.54	2.2	—	—	—

Comments ____

Instrumentaion: Quanta ✓ Hydrolab Datasonde4 ____ Horiba U22 ____ Other ____

Calibration: ph Buffers 7/10 Eh Reference ORP/pH SC Reference: 1413 umhos

Turbidity Reference Solution 0 NTU's

Sample ID: TEAD-05-05-E2.1-WF **Sample Collection Time:** 1440

Samples Collected: VOC's 8260B ✓ Sulfide ____ TOC ____ Cations ____

Trace metals ____ SVOC's ____ Explosives ____ TPH Gas ____ Dioxins ____

Perchlorate ____ Anions/Alkalinity/TDS ____ BTEXN ____ TPH Diesel ____

TSS ____ Bicarbonates ____ Nitrates/Nitites ____ Sulfites ____

MS/MSD ____ BD: ____ TB called: ____

GROUND-WATER/SURFACE WATER SAMPLING LOG

Project No: 1970991.010104 #2 Sample Location TEADN Suface Water ____ Groundwater X

Sampling Personnel: Dennis Adams/David Imlay Date: ____ Start Time 1445 Finish Time 1530

DTW — DTP — Product Thickness — Measuring Point —

Borehole Dia. — Total Casing Depth — Purge Volume — gallons Weather Rainy, Windy

Sampling Method: Dedicated Submersible Pump ____ WF ~~Qubis~~ ✓ PDB ____

Dedicated Bladder Pump ____ Portable Bladder Pump ____ Surge/Bail ____ Surge Block Type ____

Disposable Bailer ____ Grab ____ Other ____

Pump Started ____ Pump Stopped ____ Total Gallons ____ Organic Vavopr at Wellhead ____

Parameters Taken

Time (military)	Temp (C)	SC (umhos/cm)	D.O. (mg/L)	pH	EH-ORP (millivolts)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1449	21.57	3840	8.88	7.76	-170	8.1	—	—	—

Final

Time (military)	pH	SC (umhos/cm)	Temp (C)	EH-ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1448	7.75	3840	21.57	-170	8.88	8.1	—	—	—

Comments ____

Instrumentaion: Quanta ✓ Hydrolab Datasonde4 ____ Horiba U22 ____ Other ____

Calibration: ph Buffers 7/10 Eh Reference QH/pH SC Reference: 1413 umhos

Turbidity Reference Solution 0 NTU's

Sample ID: TEAD-05-05-E17-WF **Sample Collection Time:** 1500

Samples Collected: VOC's 8260B ✓ Sulfide ____ TOC ____ Cations ____

Trace metals ____ SVOC's ____ Explosives ____ TPH Gas ____ Dioxins ____

Perchlorate ____ Anions/Alkalinity/TDS ____ BTEXN ____ TPH Diesel ____

TSS ____ Bicarbonates ____ Nitrates/Nitites ____ Sulfites ____

MS/MSD ____ BD: ____ TB called: ____

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

LABORATORY EMAX

Chain of Custody ID C
Cooler ID 120505DA01
Page 1 of 3
Air Bill No. 791069691155

MWH
Phone (801) 617-3200 FAX (801) 617-4200
MWH Contact Craig Moore
Project TEAD
Project Number 197049I.0101402
Date Due STANDARD
Samplers Signature Dennis Adams

Lab ID No. (Lab Only)	Location ID	Field Sample ID	Depth Interval (ft)	Date Collected	Time Collected	Sample Number	Matrix[a]	Sampling Technique[b]	ANALYSES REQUESTED: VOCs 8260B	Trace Metals (filtered) 6010B/7000	Explosives (8330)	Trip Blank
	120505TB01			5/12/05	900	1	WQ	G	X			
	TEAD-05-05-E13-WF			5/12/05	940	2	WG	WF	X			
	TEAD-05-05-E14-WF			5/12/05	1000	3	"	"	X			
	TEAD-05-05-B06-DF-397			5/12/05	1015	4	"	DF	X			
	TEAD-05-05-I06-DF-361			5/12/05	1030	5	"	"	X			
	TEAD-05-05-B36-DF-334			5/12/05	1045	6	"	"	X			
	TEAD-05-05-E15-WF			5/12/05	1100	7	"	WF	X			
	TEAD-05-05-E11-WF			5/12/05	1115	8	"	"	X			
	TEAD-05-05-E1-WF			5/12/05	1130	9	"	"	X			
	TEAD-05-05-INF-WF			5/12/05	1245	10	"	"	X			
	TEAD-05-05-EFF-WF			5/12/05	1310	11	"	"	X			
	TEAD-05-05-C21-DF-362			5/12/05	1340	12	"	DF	X			
	TEAD-05-05-C35-DF-321			5/12/05	1400	13	"	"	X			

[a] Matrix:
SO - Soil
SE - Sediment
WS - Surface Water
WG - Ground Water
LF - Product
AA - Air
SW - Wipe
EP/TCLP Leachate
WQ - Trip Blank,
EB - Equipment Blanks
WW - Wastewater

[b] Sampling Technique:
Composite=C
Grab=G
Hand Auger=HA
Passive Diffusion Bag=DF
Bladder Pump=BP
Submersible Pump=SP
Bailer=B
Well-Head Faucet=WF

SPECIAL INSTRUCTIONS:

Relinquished by/Affiliation	Received by/Affiliation	Date	Time
Dennis Adams/MWH	Fedex	5/13/05	1600

Relinquished by/Affiliation	Received by/Affiliation	Date	Time

LABORATORY USE ONLY

SAMPLES WERE:

1 Shipped or hand delivered
Notes:

2 Ambient or Chilled
Notes:

3 Temperature _____

4 Received Broken/Leaking (Improperly Sealed)
Y N
Notes:

5 Properly Preserved
Y N
Notes:

6 Received Within Holding Times
Y N
Notes:

COC Tape Was:

1 Present on Outer Package
Y N NA

2 Unbroken on Outer Package
Y N NA

3 Present on Sample
Y N NA

4 Unbroken on Sample
Y N NA
Notes:

Discrepancies Between Sample Labels and COC Record?
Y N
Notes:

GROUND-WATER/SURFACE WATER SAMPLING LOG

Project No: 1070991.010104 02 Sample Location TEADN Suface Water ____ Groundwater X

Sampling Personnel: Dennis Adams/David Imlay Date: 5-12-05 Start Time 930 Finish Time 950

DTW 0 DTP 0 Product Thickness 0 Measuring Point 0

Borehole Dia. 0 Total Casing Depth 0 Purge Volume 0 gallons Weather Partly Cloudy

Sampling Method: Dedicated Submersible Pump ____ ~~WF Cobis~~ ✓ PDB ____

Dedicated Bladder Pump ____ Portable Bladder Pump ____ Surge/Bail ____ Surge Block Type ____

Disposable Bailer ____ Grab ____ Other ____

Pump Started ____ Pump Stopped ____ Total Gallons ____ Organic Vavopr at Wellhead ____

Parameters Taken

Time (military)	Temp (C)	SC (umhos/cm)	D.O. (mg/L)	pH	EH-ORP (millivolts)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
935	16.58	1810	13.35	7.89	-8	16.4	—	—	—

Final

Time (military)	pH	SC (umhos/cm)	Temp (C)	EH-ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
935	7.85	1810	16.58	-8	13.55	16.4	—	—	—

Comments ____

Instrumentaion: Quanta ✓ Hydrolab Datasonde4 ____ Horiba U22 ____ Other ____

Calibration: ph Buffers 7/10 Eh Reference ZH/pH SC Reference: 1413 umhos

Turbidity Reference Solution 0 NTU's

Sample ID: TEAD-05-05-E13-WF **Sample Collection Time:** 940

Samples Collected: VOC's 8260B ✓ Sulfide ____ TOC ____ Cations ____

Trace metals ____ SVOC's ____ Explosives ____ TPH Gas ____ Dioxins ____

Perchlorate ____ Anions/Alkalinity/TDS ____ BTEXN ____ TPH Diesel ____

TSS ____ Bicarbonates ____ Nitrates/Nitites ____ Sulfites ____

MS/MSD ____ BD: ____ TB called: ____

GROUND-WATER/SURFACE WATER SAMPLING LOG

Project No: 1970991.010104 02 Sample Location TEADN Suface Water ____ Groundwater X

Sampling Personnel: Dennis Adams/David Imlay Date: 5-12-05 Start Time 950 Finish Time 1005

DTW 0 DTP 0 Product Thickness 0 Measuring Point 0

Borehole Dia. 0 Total Casing Depth 0 Purge Volume 0 gallons Weather 0

Sampling Method: Dedicated Submersible Pump ____ WF Cable ✓ PDB ____

Dedicated Bladder Pump ____ Portable Bladder Pump ____ Surge/Bail ____ Surge Block Type ____

Disposable Bailer ____ Grab ____ Other ____

Pump Started ____ Pump Stopped ____ Total Gallons ____ Organic Vavopr at Wellhead ____

Parameters Taken

Time (military)	Temp (C)	SC (umhos/cm)	D.O. (mg/L)	pH	EH-ORP (millivolts)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
955	17.75	4440	5.99	7.39	-186	3.5	—	—	—

Final

Time (military)	pH	SC (umhos/cm)	Temp (C)	EH-ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
955	7.39	4440	17.75	-186	5.99	3.5	—	—	—

Comments ____

Instrumentaion: Quanta ✓ Hydrolab Datasonde4 ____ Horiba U22 ____ Other ____

Calibration: ph Buffers 7/10 Eh Reference QH/pH SC Reference: 1413 umhos

Turbidity Reference Solution 0 NTU's

Sample ID: TEAD-05-05-E14-WF **Sample Collection Time:** 1000

Samples Collected: VOC's 8260B ✓ Sulfide ____ TOC ____ Cations ____

Trace metals ____ SVOC's ____ Explosives ____ TPH Gas ____ Dioxins ____

Perchlorate ____ Anions/Alkalinity/TDS ____ BTEXN ____ TPH Diesel ____

TSS ____ Bicarbonates ____ Nitrates/Nitites ____ Sulfites ____

MS/MSD ____ BD: ____ TB called: ____

GROUND-WATER/SURFACE WATER SAMPLING LOG

Project No: 1970991.010104 Sample Location TEADN Suface Water ____ Groundwater X

Sampling Personnel: Dennis Adams/David Imlay Date: 5-12-05 Start Time 1065 Finish Time 1110

DTW 0 DTP 0 Product Thickness 0 Measuring Point 0

Borehole Dia. 0 Total Casing Depth 0 Purge Volume 0 gallons Weather Cloudy, cool

Sampling Method: Dedicated Submersible Pump ____ WF ~~Cebis~~ ✓ PDB ____

Dedicated Bladder Pump ____ Portable Bladder Pump ____ Surge/Bail ____ Surge Block Type ____

Disposable Bailer ____ Grab ____ Other ____

Pump Started ____ Pump Stopped ____ Total Gallons ____ Organic Vavopr at Wellhead ____

Parameters Taken

Time (military)	Temp (C)	SC (umhos/cm)	D.O. (mg/L)	pH	EH-ORP (millivolts)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1055	17.34	1620	11.04	7.96	-212	3.1	—	—	—

Final

Time (military)	pH	SC (umhos/cm)	Temp (C)	EH-ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1055	7.96	1620	17.34	____	11.04	3.1	—	—	—

Comments ____

Instrumentaion: Quanta ✓ Hydrolab Datasonde4 ____ Horiba U22 ____ Other ____

Calibration: ph Buffers 7/10 Eh Reference QH/pH SC Reference: 1413 umhos

Turbidity Reference Solution 0 NTU's

Sample ID: TEAD-05-05-E15-WF **Sample Collection Time:** 1100

Samples Collected: VOC's 8260B ✓ Sulfide ____ TOC ____ Cations ____

Trace metals ____ SVOC's ____ Explosives ____ TPH Gas ____ Dioxins ____

Perchlorate ____ Anions/Alkalinity/TDS ____ BTEXN ____ TPH Diesel ____

TSS ____ Bicarbonates ____ Nitrates/Nitites ____ Sulfites ____

MS/MSD ____ BD: ____ ____ TB called: ____ ____

GROUND-WATER/SURFACE WATER SAMPLING LOG

Project No: 1970991.010104 Sample Location TEADN Suface Water ____ Groundwater X

Sampling Personnel: Dennis Adams/David Imlay Date: 5-13-05 Start Time 1110 Finish Time 1125

DTW 0 DTP 0 Product Thickness 0 Measuring Point 0

Borehole Dia. 0 Total Casing Depth 0 Purge Volume 0 gallons Weather Cloudy/Cool

Sampling Method: Dedicated Submersible Pump ____ WF ~~Cable~~ ✓ PDB ____

Dedicated Bladder Pump ____ Portable Bladder Pump ____ Surge/Ball ____ Surge Block Type ____

Disposable Bailer ____ Grab ____ Other ____

Pump Started ____ Pump Stopped ____ Total Gallons ____ Organic Vavopr at Wellhead ____

Parameters Taken

Time (military)	Temp (C)	SC (umhos/cm)	D.O. (mg/L)	pH	EH-ORP (millivolts)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1112	19.14	2250	7.36	7.84	-205	2.2	—	—	—

Final

Time (military)	pH	SC (umhos/cm)	Temp (C)	EH-ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1112	7.84	2250	19.14	-205	7.36	2.2	—	—	—

Comments ____

Instrumentaion: Quanta ✓ Hydrolab Datasonde4 ____ Horiba U22 ____ Other ____

Calibration: ph Buffers 7/10 Eh Reference ORP/pH SC Reference: 1413 umhos

Turbidity Reference Solution 0 NTU's

Sample ID: TEAD-05-05-F11-WF **Sample Collection Time:** 1115

Samples Collected: VOC's 8260B ✓ Sulfide ____ TOC ____ Cations ____

Trace metals ____ SVOC's ____ Explosives ____ TPH Gas ____ Dioxins ____

Perchlorate ____ Anions/Alkalinity/TDS ____ BTEXN ____ TPH Diesel ____

TSS ____ Bicarbonates ____ Nitrates/Nitites ____ Sulfites ____

MS/MSD ____ BD: ____ TB called: ____

GROUND-WATER/SURFACE WATER SAMPLING LOG

Project No: 1970991.010104 Sample Location TEADN Suface Water ____ Groundwater X

Sampling Personnel: Dennis Adams/David Imlay Date: 5-12-05 Start Time 1125 Finish Time 1140

DTW 0 DTP 0 Product Thickness 0 Measuring Point 0

Borehole Dia. 0 Total Casing Depth 0 Purge Volume 0 gallons Weather cloudy, 80's

Sampling Method: Dedicated Submersible Pump ____ WF Cable ✓ PDB ____

Dedicated Bladder Pump ____ Portable Bladder Pump ____ Surge/Bail ____ Surge Block Type ____

Disposable Bailer ____ Grab ____ Other ____

Pump Started ____ Pump Stopped ____ Total Gallons ____ Organic Vavopr at Wellhead ____

Parameters Taken

Time (military)	Temp (C)	SC (umhos/cm)	D.O. (mg/L)	pH	EH-ORP (millivolts)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1125	18.33	2390	6.73	7.70	-207	1.2	—	—	—

Final

Time (military)	pH	SC (umhos/cm)	Temp (C)	EH-ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1125	7.70	2390	18.33	-207	6.73	1.2	—	—	—

Comments ____

Instrumentaion: Quanta ✓ Hydrolab Datasonde4 ____ Horiba U22 ____ Other ____

Calibration: ph Buffers 7/10 Eh Reference ZH/pH SC Reference: 1413 umhos

Turbidity Reference Solution 0 NTU's

Sample ID: TEAD-05-05-EI-WF **Sample Collection Time:** 1130

Samples Collected: VOC's 8260B ✓ Sulfide ____ TOC ____ Cations ____

Trace metals ____ SVOC's ____ Explosives ____ TPH Gas ____ Dioxins ____

Perchlorate ____ Anions/Alkalinity/TDS ____ BTEXN ____ TPH Diesel ____

TSS ____ Bicarbonates ____ Nitrates/Nitites ____ Sulfites ____

MS/MSD ____ BD: ____ ____ TB called: ____ ____

GROUND-WATER/SURFACE WATER SAMPLING LOG

Project No: 1970691.010104 02 Sample Location TEADN Suface Water ____ Groundwater X

Sampling Personnel: Dennis Adams/David Imlay Date: 5-12-05 Start Time 1240 Finish Time 1300

DTW 0 DTP 0 Product Thickness 0 Measuring Point 0

Borehole Dia. 0 Total Casing Depth 0 Purge Volume 0 gallons Weather Cloudy, Cool

Sampling Method: Dedicated Submersible Pump ____ WF Cabis ✓ PDB ____

Dedicated Bladder Pump ____ Portable Bladder Pump ____ Surge/Bail ____ Surge Block Type ____

Disposable Bailer ____ Grab ____ Other ____

Pump Started ____ Pump Stopped ____ Total Gallons ____ Organic Vavopr at Wellhead ____

Parameters Taken

Time (military)	Temp (C)	SC (umhos/cm)	D.O. (mg/L)	pH	EH-ORP (millivolts)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1242	17.28	2450	6.13	7.94	-187	0.0	—	—	—

Final

Time (military)	pH	SC (umhos/cm)	Temp (C)	EH-ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1242	7.94	2450	17.28	-187	6.13	0.0	—	—	—

Comments ____

Instrumentaion: Quanta ____ Hydrolab Datasonde4 ____ Horiba U22 ____ Other ____

Calibration: ph Buffers ____ Eh Reference ____ SC Reference: ____ umhos

Turbidity Reference Solution 0 NTU's

Sample ID: TEAD-05-05-GFF-WF **Sample Collection Time:** 1245

Samples Collected: VOC's 8260B ✓ Sulfide ____ TOC ____ Cations ____

Trace metals ____ SVOC's ____ Explosives ____ TPH Gas ____ Dioxins ____

Perchlorate ____ Anions/Alkalinity/TDS ____ BTEXN ____ TPH Diesel ____

TSS ____ Bicarbonates ____ Nitrates/Nitites ____ Sulfites ____

MS/MSD ____ BD: ____ TB called: ____

GROUND-WATER/SURFACE WATER SAMPLING LOG

Project No: 1970991.010104 Sample Location TEADN Suface Water ____ Groundwater X

Sampling Personnel: Dennis Adams/David Imlay Date: 5-12-05 Start Time 1300 Finish Time 1320

DTW 0 DTP 0 Product Thickness 0 Measuring Point 0

Borehole Dia. 0 Total Casing Depth 0 Purge Volume 0 gallons Weather Cloudy, Cool

Sampling Method: Dedicated Submersible Pump ____ WF Cabis ✓ PDB ____

Dedicated Bladder Pump ____ Portable Bladder Pump ____ Surge/Bail ____ Surge Block Type ____

Disposable Bailer ____ Grab ____ Other ____

Pump Started ____ Pump Stopped ____ Total Gallons ____ Organic Vavopr at Wellhead ____

Parameters Taken

Time (military)	Temp (C)	SC (umhos/cm)	D.O. (mg/L)	pH	EH-ORP (millivolts)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1310	15.91	2440	7.80	8.22	-188	2.0	—	—	—

Final

Time (military)	pH	SC (umhos/cm)	Temp (C)	EH-ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)	Flow Rate	Vol Evac. (gal.)	Comments
1310	8.22	2440	15.91	-188	7.80	2.0	—	—	—

Comments ____

Instrumentaion: Quanta ✓ Hydrolab Datasonde4 ____ Horiba U22 ____ Other ____

Calibration: ph Buffers 7/10 Eh Reference QH/pH SC Reference: 1413 umhos

Turbidity Reference Solution 0 NTU's

Sample ID: TEAD-05-05-EFF-WF **Sample Collection Time:** 1315

Samples Collected: VOC's 8260B ✓ Sulfide ____ TOC ____ Cations ____

Trace metals ____ SVOC's ____ Explosives ____ TPH Gas ____ Dioxins ____

Perchlorate ____ Anions/Alkalinity/TDS ____ BTEXN ____ TPH Diesel ____

TSS ____ Bicarbonates ____ Nitrates/Nitites ____ Sulfites ____

MS/MSD ____ BD: ____ TB called: ____

APPENDIX B

QUALITY CONTROL SUMMARY REPORT

TABLE OF CONTENTS

TABLE OF CONTENTS

(continued)

TABLES

(Tables follow the end of report)

LIST OF ACRONYMS

%D	percent difference
%R	percent recovery
CDQMP	Chemical Data Quality Management Plan
CVS	calibration verification standards
DQO	data quality objective
EMAX	EMAX Laboratories Inc.
GC/MS	gas chromatography/mass spectrometry
ICAL	initial calibration
ICV	initial calibration verification
LCS	laboratory control sample
LCD	laboratory control duplicate
MDL	method detection limit
MS/MSD	matrix spike/matrix spike duplicate
MWH	MWH Americas, Inc
PARCC	precision, accuracy, representativeness, comparability, and completeness
QC	quality control
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
SOP	standard operating procedure
SPCC	system performance check compound
SWMU	Solid Waste Management Unit
TCE	trichloroethene
TEAD	Tooele Army Depot
VOC	volatile organic compound
USACE	United States Army Corps of Engineers
U.S. EPA	United States Environmental Protection Agency

B1.0 DATA VERIFICATION AND VALIDATION

B1.1 INTRODUCTION

B1.1.0.1. This report presents the results of the verification and validation of analytical data for extraction well, influent, and effluent samples collected at Solid Waste Management Unit (SWMU) 2, Tooele Army Depot (TEAD), Utah, as part of groundwater monitoring. Samples were collected on May 9, 11, 12, 17, 18, 19, and 31, 2005. EMAX Laboratories Inc. (EMAX) of Torrance, California provided analytical support for this project. The MWH Americas, Inc (MWH) Project Chemist conducted a Level III verification for all data and conducted a Level IV data verification for 10 percent of the data.

B1.1.0.2. Samples were analyzed for volatile organic compounds (VOCs) by method SW-846/8260B. The analytical results for the May 2005 sampling round are presented by method in Table B-1.

B1.1.0.3. The analytical results were evaluated against the project-specific data quality objectives (DQOs), which are quantitative and qualitative statements that specify data quality and are expressed in terms of precision, accuracy, representativeness, comparability, and completeness (PARCC). This data evaluation is presented in terms of the PARCC criteria and was based on the *Chemical Data Quality Management Plan (CDQMP)* Tooele Army Depot, Final Revision 3 (United States Army Corps of Engineers [USACE], 2004) and the TEAD post closure permit.

B1.1.0.4. Data verification is the process of evaluating the quality control (QC) parameters against the criteria established by the analytical methods in the SW-846 and the CDQMP and qualifying those data points where the QC criteria is outside the established criteria. The following QC parameters were evaluated:

- CDQMP compliance
- Sample extraction and analytical holding times

- Method and trip blank sample results
- Reporting limits (RLs)
- Field duplicate sample results
- Tune standard results
- Initial calibration (ICAL), initial calibration verification (ICV), and continuing calibration verification standards (CVS) results
- Surrogate spike recoveries
- Laboratory control sample (LCS) and laboratory control duplicate (LCD) results
- Matrix spike/matrix spike duplicate (MS/MSD) sample results
- Internal standard results.

Sample data that were qualified due to the data verification are listed in Table B-2. Sample batch information is listed in Table B-3.

B1.1.0.5. In addition to the Level III data verification process, a Level IV verification was conducted for 10 percent of the data in accordance with the CDQMP. In addition to the QC parameters reviewed during the Level III verification process, the following data review was conducted as part of the Level IV verification:

- Review of raw data from the instrument (i.e. chromatograms, quantitation reports, spectra)
- Back check of all calculations
- Review of sample preparation and analytical logs

B1.1.0.6. A qualitative assessment was also conducted to evaluate whether the verified data were of sufficient quality to support the project objective (i.e., end use), which is compliance with the quarterly monitoring requirements.

B1.1.07. The validation process was conducted by assessing the following:

- Were all data that were scheduled for this project collected, i.e., were groundwater samples collected from groundwater as it enters and exits the groundwater treatment system, and from every active extraction well?
- Did the sample RLs or method detection limits (MDLs) meet the permit specifications?
- Were data qualified with an "UJ" flag as an estimated RL and did these data impact the decision making process, i.e., would the same decision have been made if the data had not been "UJ" flagged?
- Was the data completeness goal of 90 percent for this project met, i.e., were sufficient data of sufficient quality collected to meet the project completeness goal?

B1.1.0.8. The following sections describe the data verification procedures, discuss data that have significant QC problems (i.e., rejected data), and describe any analytical method or CDQMP deviations.

B2.0 DATA VERIFICATION/VALIDATION RESULTS

B2.1 COMPLETENESS EVALUATION

B2.1.1 Sampling Completeness

B2.1.1.1 All samples and QC samples were collected as scheduled resulting in 100 percent completeness for this project.

B2.1.2 Analytical Completeness

B2.1.2.1. Analytical completeness was evaluated on a per analyte basis using the following equation:

$$\text{Completeness} = \frac{\text{Number of valid data points}}{\text{Total number of measurements}} \times 100$$

Where: The number of valid data points is the total number of valid analytical measurements based on the precision, accuracy, and holding time evaluation.

Based on the results of the data verification described in the following sections, all data are considered valid as qualified. Analytical completeness was 100 percent, which met the analytical completeness goal of 90 percent for all analytes.

B2.1.3 Data Validation in Relation to Completeness

B2.1.3.1. The results of the data validation in relation to completeness indicate that all samples were collected as scheduled and analyzed in accordance with the CDQMP.

B2.2 REPRESENTATIVENESS EVALUATION

B2.2.0.1. Representativeness is a qualitative expression of the degree to which sample data accurately and precisely represent a characteristic of a population, a sampling point,

or an environmental condition. Representativeness is maximized by ensuring that, for a given project, the number and location of sampling points and the sample collection and analysis techniques are appropriate for the specific investigation, and that the sampling and analysis program provides information that reflects "true" site conditions. Laboratory data were evaluated for representativeness by assessing compliance with the following:

- CDQMP Tooele Army Depot, Final Revision 3 (USACE, 2004)
- Sample preservation and holding time criteria
- Method and trip blank criteria
- Field duplicate sample results
- Reporting limit criteria

B2.2.1 CDQMP Compliance Evaluation

B2.2.1.1. Based on the data verification, all samples were analyzed following the quality control criteria specified in the CDQMP.

B2.2.2 Sample Preservation Evaluation

B2.2.2.1. Temperature blanks were included with each sample cooler for measurement upon receipt at the laboratory to assess whether the samples met temperature requirements. The temperature criterion was met for all samples.

B2.2.3 Holding Time Evaluation

B2.2.3.1. Holding time reflects the length of time after sample collection that a sample or extract remains representative of environmental conditions. For VOCs, the length of time between sample collection and analysis was evaluated. Holding times were compared to standard method-specific holding times accepted by the United States Environmental Protection Agency (U.S. EPA). Data for samples that were extracted and analyzed within

holding time criteria are considered representative. Holding times are presented in Table B-4. All sample holding times were met for this sampling round.

B2.2.4 Sample Blanks Evaluation

B2.2.4.1 If target analytes were detected in a blank and an associated investigative sample, the sample data were evaluated and qualified using the following criteria:

- **Non-Common Laboratory Contaminants.** If a target analyte was detected in a blank and in an associated sample, and the concentration of the analyte in the environmental sample was less than five times the concentration detected in the blank, the detection of the analyte in the sample was considered a false positive. The sample datum was qualified with a "UB" flag to indicate that the datum is considered not detected at the concentration reported based on blank data. If the concentration of a target analyte in the environmental sample was greater than five times the concentration detected in an associated blank, the sample datum was with a "B" flag to indicate the analyte was detected in an associated blank.

- **Common Laboratory Contaminants.** If a target analyte was detected in a blank and in an associated sample, and the concentration of the analyte in the environmental sample was less than ten times the concentration detected in the blank, the detection of the analyte in the sample was considered a false positive. The sample datum was qualified with a "UB" flag to indicate the datum is considered not detected at the reported concentration based on blank data. If the concentration of a target analyte in the environmental sample was greater than ten times the concentration detected in an associated blank, the sample datum was qualified with a "B" flag to indicate the analyte was detected in an associated blank.

B2.2.4.2. Method Blanks. The method blank contains all the reagents used in the processing of samples and is carried through the complete analytical procedure used for

the samples. Method blank sample data are presented in Table B-5. No analytes were detected in the method blank samples.

B2.2.4.3. Trip Blank Evaluation. A trip blank accompanied each sample cooler and was analyzed to verify that the samples were not contaminated by the sample containers or other samples during transport to and/or at the laboratory. The trip blank accompanied the empty bottle sets to the site and consisted of a set of VOC sample bottles that had been filled by the laboratory with organic-free water. The trip blanks remained unopened and with the samples during sample collection and shipping. The trip blank data are presented in Table B-6. No analytes were detected in the trip blank samples.

B2.2.5 Reporting Limit Evaluation

B2.2.5.1. The RL is the lowest concentration that can be reliably achieved within limits of precision and accuracy during routine instrument operating conditions and is based on the MDL for each analyte.

B2.2.5.2. The RLs reported by the laboratory were compared to the criteria specified in the TEAD Post Closure Permit. All sample RLs were in less than or equal to those listed in the TEAD Post Closure Permit. If a target compound was detected between the MDL and RL, the result was qualified with a "J" flag to indicate the data are estimated and reflect a value between the MDL and RL.

B2.2.6 Field Duplicate Evaluation

B2.2.6.1. Field duplicate samples were collected and analyzed to evaluate sampling and analytical representativeness and precision. Because precision is affected by several variables including sample heterogeneity, collection procedures, preparation, and analysis, the results of field duplicates were used as additional evidence to support data quality rather than as a basis for accepting or rejecting data.

B2.2.6.2. The relative percent difference (RPD) was calculated only for those analytes that were detected above the reporting limit in both the environmental and field duplicate

samples. The field duplicate data are presented in Table B-7. A review of the sample results and the RPDs indicate good agreement between the sample and its respective duplicate.

B2.2.7 Data Validation Results in Relation to Representativeness

B2.2.7.1. The results of the data validation in relation to representativeness indicate that the data are of sufficient quality to support end use. All samples were collected as scheduled and analyzed in accordance with the CDQMP.

B2.3 ACCURACY EVALUATION

B2.3.0.1. Accuracy is a measure of the bias of a method or the level of agreement between a measurement and a known true value. Accuracy is evaluated by percent recovery (%R), which is calculated using the following equation:

$$\%R = \frac{A - B}{C} \times 100$$

Where: A = the measured concentration of the spiked analyte in a spiked sample

B = the measured concentration of the spiked analyte in an unspiked sample

C = the concentration of the analyte used for spiking.

Laboratory accuracy was evaluated using the instrument calibration and internal standard results and surrogate, MS/MSD, LCS and LCD spiking compound recoveries.

B2.3.1 Tune Standard Evaluation

B2.3.1.1 For gas chromatography/mass spectroscopy (GC/MS) methods the analytical instruments must be tuned to demonstrate that the instrument is functioning such that it will detect the compounds of interest during analysis. Sample analysis can not proceed

unless the tune standard criteria are met; otherwise sample data are flagged with an "R" and are not usable. All tune standards for VOC analysis were within acceptance criteria.

B2.3.2 Initial Calibration, Initial Calibration Verification, and Continuing Calibration Verification Standards Evaluation

B2.3.2.1. ICAL, ICV, and CVS were analyzed prior to and during sample analysis as specified by the analytical method. The ICAL is used to demonstrate linearity of instrument calibration, the ICV is used to verify the ICAL by using a second source standard, and the CVS is used to assess whether the ICAL remains valid. The ICAL, ICV, and CVS results were evaluated against the QC criteria specified in the CDQMP. If either the ICAL, ICV, or CVS QC criteria were not met the data for all samples associated with the ICAL, ICV, or CVS were qualified as follows:

- **ICAL Relative Standard Deviation Outside Acceptance Criteria.** If the relative standard deviation (RSD) or correlation coefficient (r^2) was outside acceptance criterion, the calibration curve was evaluated to determine which standard caused the non-conformance. If the lowest level of the calibration curve was not the cause of the non-conformance, and the laboratory demonstrated that the RL was met, no non-detect data were qualified. For detected compounds where the RSD or r^2 exceeded the acceptance criteria, the data were considered estimated with an unknown bias and were qualified with a "J" flag.

- **ICAL Average Relative Response Factor (RRF) Outside Acceptance Criteria (GC/MS Analysis Only).** If the RRF was outside acceptance criteria for system performance check compounds (SPCCs) (refer to the CDQMP for method specific criteria or the acceptance criteria of > 0.05 for non-SPCC compounds), the sample data were qualified as follows. If the analytes were not detected in the associated samples, the sample results were "R" qualified to indicate the data are not usable. If the corresponding analytes were detected in the associated samples, the sample results were qualified with a "J" flag to indicate the data were estimated.

- **ICV Percent Difference (%D) or % Drift Outside Acceptance Criteria.** If the ICV %D (if RSD was used) or the %Drift (if r^2 was used) was outside acceptance criteria the bias was determined. If the bias was high, non-detected analytes associated with the ICV, were not qualified; detected analytes associated with the ICV were qualified with a "J" flag indicating the datum was estimated, potentially biased high. If the bias was determined to be low non-detected analytes associated with the ICV were qualified with a "UJ" flag, indicating a possible false negative, and the RL is estimated; detected analytes associated with the ICV were qualified with a "J-" flag indicating the data are estimated, potentially biased low.

- **CVS Percent Difference (%D) or Percent Drift Outside Acceptance Criteria.** If the CVS %D (if RSD was used) or the %Drift (if r^2 was used) was outside acceptance criteria the bias was determined. If the bias was high, non-detected analytes associated with the CVS, were not qualified; detected analytes associated with the CVS were qualified with a "J" flag indicating the datum was estimated, potentially biased high. If the bias was determined to be low, non-detected analytes associated with the CVS were qualified with a "UJ" flag, indicating a possible false negative, and the RL is estimated; detected analytes associated with the CVS were qualified with a "J" flag indicating the data are estimated, potentially biased low.

- **The CVS Average RRF was Below Acceptance Criteria.** If the CVS average RRF was outside the acceptance criterion of <0.05, the sample data were qualified as follows. Compounds below the acceptance criteria indicate a potential bias during sample analysis. If the analytes were not detected in the associated samples, the sample results were "R" qualified to indicate the data are not usable. If the corresponding analytes were detected in the associated samples, the sample results were qualified with a "J" flag to indicate the data were estimated.

B2.3.2.2. No sample data were qualified due to ICAL or ICV results. All CVS RRFs and percent drift were within acceptance criteria. Sample data qualified due to the CVS %D are listed in Table B-2 with "CVS" as the QC type.

B2.3.2.3. One 1,1,2,2-tetrachloroethane sample result was qualified with a "UJ" flag because the associated CVS result was below the acceptance criterion. Although this datum was qualified as potential false negatives, there is no affect on the decision making process or data usability because the datum is consistent with the historical data.

B2.3.3 Surrogate Spike Evaluation

B2.3.3.1. Surrogate spike recoveries were used to evaluate the accuracy of the analytical data and to monitor laboratory control procedures for organic analyses. Samples were spiked with surrogates according to the laboratory's standard operating procedures (SOPs). The surrogate spike recovery data were evaluated using the acceptance criteria outlined in the CDQMP. Surrogate recoveries are presented with the sample data in Table B-1. The following criteria were used to evaluate surrogate recoveries:

- **Surrogate Recoveries Below Acceptance Criteria**. Surrogate recoveries below the acceptance criteria indicate a potential low bias during sample analysis. Therefore, if the surrogate recovery was below the acceptance criteria and the surrogate recovery was greater than or equal to ten percent, non-detect compounds associated with the surrogate were qualified with a "UJ" flag indicating a possible false negative and the RL is estimated. If the surrogate recovery was less than 10 percent, then the associated compounds were qualified with an "R" flag indicating the data may not be usable. If analytes associated with the surrogates were detected in the sample, the sample results were qualified with a "J" flag to indicate the data are estimated and are potentially biased low.

- **Surrogate Recoveries Above Acceptance Criteria**. Surrogate recoveries above the acceptance criteria indicate a potential high bias during sample analysis. Therefore, if the surrogate recovery was above the acceptance

criteria, non-detected compounds associated with the surrogate were not qualified because of the potentially high bias. If the compounds associated with the surrogate were detected in the sample, the sample results were qualified with a "J" flag to indicate the data are estimated and potentially biased high.

B2.3.3.1. All surrogate recoveries were within the acceptance criteria specified in the CDQMP.

B2.3.4 Matrix Spike/Matrix Spike Duplicate Sample Evaluation

B2.3.4.1. Site specific MS and MSD samples were analyzed to assess accuracy and to identify possible adverse matrix effects. These samples were spiked with target analytes according to the CDQMP prior to extraction or analysis. The percent recoveries of the spiked compounds were compared to the CDQMP criteria. MS/MSD data are presented in Table B-8. The criteria used to evaluate the MS/MSD samples are described below.

B2.3.4.2. Matrix spike compounds below the acceptance criteria indicate a potential low bias during sample analysis. The following criteria were used for data verification:

- **MS/MSD Recovery Below Acceptance Criteria**. Matrix spike compounds below the acceptance criteria indicate a potential low bias during sample analysis. Therefore, if corresponding analytes were not detected in the parent sample, the data were qualified with a "UJ" flag, indicating a possible false negative, and the RL is estimated. If corresponding analytes were detected in the parent sample the data were qualified with a "J" flag indicating the data are estimated and are potentially biased low.

- **MS/MSD Recovery Above Acceptance Criteria**. MS/MSD recoveries above the acceptance criteria indicate a potential high bias during sample analysis. Therefore, if corresponding analytes were not detected in the parent sample, data were not qualified because the recovery indicates a high bias and does not affect non-detect analytes. If corresponding analytes were detected in

the parent sample data were qualified with a "J" flag indicating the data are estimated and are potentially biased high.

- **High Analyte Concentration in Parent Sample.** If the concentration in the parent sample was more than four times the MS/MSD spike concentration and the MS/MSD recoveries were outside the acceptance criteria, no data were qualified.

- **High and Low MS/MSD Recovery Exceedences.** Bias cannot be determined if a spike recovery is above the acceptance criterion in the MS and below the acceptance criterion in the MSD, or vice versa. Therefore, the following procedures were used to validate parent sample data. If the parent sample was non-detect for the analytes that were outside the acceptance criteria in the MS/MSD, the parent sample data were not qualified. If the analytes that were outside acceptance criteria in the MS/MSD were detected in the parent sample, the parent sample data were qualified with a "J" flag to indicate that the data are estimated.

B2.3.4.3. All MS/MSD results were with the acceptance criteria specified in the CDQMP.

B2.3.5 Laboratory Control Sample/Laboratory Control Sample Duplicate Evaluation

B2.3.5.1. Laboratory control samples and LCDs were analyzed to assess accuracy in the absence of matrix effects. Deionized water was spiked with target analytes according to the CDQMP prior to analysis. The spiked compounds percent recoveries were compared to the QC limits established in the CDQMP. The same criteria used to evaluate the MS/MSD samples were used to evaluate the LCS and LCD samples, except that all sample data associated with the LCS and LCD were qualified instead of just the parent sample for both organic and metals analyses. LCS and LCD data are presented by analytical method in Table B-9. Sample data that were qualified due to LCS data are

listed in Table B-2 with "LCS" as the QC type. All LCD recoveries were within the acceptance criteria specified in the CDQMP.

B2.3.5.2. One trichloroethene (TCE) sample result was qualified with a "J" flag because the spike recovery was above the acceptance criterion. Although the datum has been qualified as estimated with a potential high bias, the datum is consistent with the historical data

B2.3.5.3. Three 1,1-dichloroethene sample results were qualified with a "UJ" flag indicating a possible false negative. Although the data have been qualified as estimated with a potential low bias, the data are consistent with the historical data.

B2.3.5.4. Three Benzene sample results were qualified with a "UJ" flag indicating a possible false negative. Although the data have been qualified as estimated with a potential low bias, the data are consistent with the historical data.

B2.3.6 Internal Standard Evaluation

B2.3.6.1 Internal standards are used to access accuracy and to determine the concentration of target analytes in samples for VOC analyses. Internal standards are spiked in the sample after sample preparation/extraction, but prior to analysis. Analyte concentration is determined using the following equation:

$$C_S = \frac{A_S \times C_{IS}}{A_{IS} \times RF}$$

Where: C_S = Concentration of the analyte or surrogate

A_S = Peak area (or height) of the analyte or surrogate

C_{IS} = Concentration of the IS

A_{IS} = Area of the IS

RF = Average response factor of calibration curve

B2.3.6.2. Accuracy was assessed by comparing the IS recovery to the control limits established by the method. The following criteria were used to evaluate IS data:

- **Internal Standard Recovery Below Acceptance Criteria.** If the IS recovery was below 50 percent, non-detected analyte associated with the IS were qualified with a "UJ" flag indicating a possible false negative and the RL is estimated. Detected analytes were qualified with a "J" flag indicating the data were estimated.

- **Internal Standard Recovery Above Acceptance Criteria.** If the IS recovery is above 200 percent, non-detect compounds were not qualified. Detected compounds were qualified with a "J" flag indicating the data were estimated.

B2.3.6.3. All IS recoveries were within acceptance criteria.

B2.3.7 Data Validation Results in Relation to Accuracy

B2.3.7.1. The results of the data validation in relation to accuracy indicate that the data are of sufficient quality to support end use.

B2.4 PRECISION EVALUATION

B2.4.0.1. Precision measures the reproducibility of measurements under a given set of conditions. Laboratory precision was evaluated using the RPD calculated between the MS and MSD samples and between parent and field duplicate samples.

B2.4.0.2. Relative Percent Difference Evaluation. RPD is calculated using the following equation:

$$RPD = \left(\frac{|A - B|}{[A + B]/2} \right) \text{ x } 100$$

Where: A and B are the reported concentrations for sample duplicate analyses.

B2.4.1 Matrix Spike/Matrix Spike Duplicate Sample Evaluation

B2.4.1.1. The following criteria were used for the MS/MSD precision evaluation. If the RPD exceeded the acceptance criteria, corresponding analytes detected in the parent sample were qualified with a "J" flag indicating the data are estimated. Because bias cannot be determined when target analytes are not detected in a sample, parent sample data for non-detected analytes were not qualified. The MS/MSD RPD data are presented Table B-8. No sample data were qualified due to MS/MSD RPD results.

B2.4.2 Field Duplicate Sample Evaluation

B2.4.2.1. As discussed previously, sample data were not qualified based on field duplicate sample results. These data were used qualitatively as additional evidence to support data comparability and quality. The RPDs for the field duplicate samples are presented in Table B-7. A comparison of the sample results and the RPDs indicate good agreement between the parent sample and its respective duplicate.

B2.4.3 Data Validation Results in Relation to Precision

B2.4.3.1. The results of the data validation in relation to precision indicate that the data are of sufficient quality to support end use. All samples were analyzed in accordance with SW-846, the CDQMP, and no data were qualified as a result of out of compliance precision.

B2.5 COMPARABILITY EVALUATION

B2.5.0.1. Comparability is a qualitative parameter that expresses the confidence that one data set may be compared to another. For this project, sample collection and analysis followed standard methods and the data were reported using standard units of measure. In addition, data from this sampling round were compared to previous sampling rounds and the data from this sampling round were found comparable to previous sampling rounds.

B3.0 DATA VERIFICATION/VALIDATION SUMMARY

B3.0.0.1. Precision. Based on the results of the MS/MSD and field duplicate sample analyses, the data are precise as reported.

B3.0.0.2. Accuracy. Based on the tune standard, ICAL, ICV, CVS, internal standard, surrogate, MS/MSD, LCS, and LCD results, the data are accurate as qualified.

B3.0.0.3. Representativeness. Based on the results of the holding time evaluation, method and trip blank sample analysis, the field duplicate sample evaluation, and the RL evaluation the data are considered representative as reported.

B3.0.0.4. Comparability. Based on the results of the comparability evaluation, the results from this sampling round are comparable. Standard methods of sample collection and standard units of measure were used during this project. The analysis performed by the laboratory was in accordance with current SW-846 and EPA methodology and the CDQMP. In addition, comparison of data from this sampling round to previously collected data indicate the data are comparable.

B3.0.0.5. Completeness. Based on the results of the data verification and validation, all data are considered usable. Both sampling and analytical completeness were 100 percent.

B3.0.0.6. Based on the results of the data validation, the data collected for this sampling round were of sufficient quantity and quality to meet the project objectives.

REFERENCES

United States Army Corps of Engineers, 2004. *Chemical Data Quality Management Plan (CDQMP)* Tooele Army Depot, Final Revision 3.

United States Environmental Protection Agency, 1986. *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846) (Third Edition, Final Update III, December 1996).

TABLE B-1

VOLATILE ORGANIC COMPOUNDS SAMPLE DATA SUMMARY
MAY 2005
SWMU 2-TOOELE ARMY DEPOT, UTAH

Location Identification		E-01	E-02-1
Field Sample Identification		TEAD-05-05-E1-WF	TEAD-11-05-05-E2.1-WF
Analyte/Methods (Units)	**Date Collected**	**5/12/2005**	**5/11/2005**
Volatile Organic Compounds/SW8260B (µg/l)			
1,1,1-Trichloroethane		<1.0	<1.0
1,1,2,2-Tetrachloroethane		<1.0	<1.0
1,1,2-Trichloroethane		<1.0	<1.0
1,1-Dichloroethane		**0.53 T**	<1.0
1,1-Dichloroethene		<1.0	<1.0 UJ
1,2-Dichlorobenzene		<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0
1,3-Dichlorobenzene		<1.0	<1.0
1,4-Dichlorobenzene		<1.0	<1.0
Benzene		<1.0	<1.0 UJ
Bromodichloromethane		<1.0	<1.0
Bromoform		<1.0	<1.0
Bromomethane		<1.0	<1.0
Carbon tetrachloride		**0.96 T**	<1.0
Chlorobenzene		<1.0	<1.0
Chloroethane		<1.0	<1.0
Chloroform		<1.0	<1.0
Chloromethane		<2.0	<2.0
cis-1,3-Dichloropropene		<1.0	<1.0
Dibromochloromethane		<1.0	<1.0
Dichlorodifluoromethane		<1.0	<1.0
Ethylbenzene		<1.0	<1.0
Methylene chloride		<5.0	<5.0
Tetrachloroethene (PCE)		<1.0	<1.0
Toluene		<1.0	<1.0
Total 1,2-Dichloroethene		<1.0	<1.0
trans-1,3-Dichloropropene		<1.0	<1.0
Trichloroethene (TCE)		**21**	**13**
Trichlorofluoromethane		<1.0	<1.0
Vinyl chloride		<2.0	<2.0
Xylenes, Total		<1.0	<1.0
Surrogate (%)	**Limit**		
1,2-Dichloroethane-d4	70 - 130	107	94
1-Bromo-4-fluorobenzene	70 - 130	100	78
Toluene-D8	70 - 130	99	87

µg/l micrograms per liter.
Bold Bolded result indicates positively identified compound.
J Data are estimated due to associated quality control data.
T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.
UJ Potential low bias, possible false negative.

TABLE B-1

VOLATILE ORGANIC COMPOUNDS SAMPLE DATA SUMMARY
MAY 2005
SWMU 2-TOOELE ARMY DEPOT, UTAH

Location Identification		E-02-2	E-02-2 Dup
Field Sample Identification		TEAD-11-05-05-E2-2-WF	TEAD-11-05-05-S-E2-2-WF
Analyte/Methods (Units)	**Date Collected**	**5/11/2005**	**5/11/2005**
Volatile Organic Compounds/SW8260B (µg/l)			
1,1,1-Trichloroethane		<1.0	<1.0
1,1,2,2-Tetrachloroethane		<1.0	<1.0
1,1,2-Trichloroethane		<1.0	<1.0
1,1-Dichloroethane		**0.22 T**	<1.0
1,1-Dichloroethene		<1.0 UJ	<1.0 UJ
1,2-Dichlorobenzene		<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0
1,3-Dichlorobenzene		<1.0	<1.0
1,4-Dichlorobenzene		<1.0	<1.0
Benzene		<1.0 UJ	<1.0 UJ
Bromodichloromethane		<1.0	<1.0
Bromoform		<1.0	<1.0
Bromomethane		<1.0	<1.0
Carbon tetrachloride		**0.58 T**	**0.49 T**
Chlorobenzene		<1.0	<1.0
Chloroethane		<1.0	<1.0
Chloroform		<1.0	<1.0
Chloromethane		<2.0	<2.0
cis-1,3-Dichloropropene		<1.0	<1.0
Dibromochloromethane		<1.0	<1.0
Dichlorodifluoromethane		<1.0	<1.0
Ethylbenzene		<1.0	<1.0
Methylene chloride		<5.0	<5.0
Tetrachloroethene (PCE)		<1.0	<1.0
Toluene		<1.0	<1.0
Total 1,2-Dichloroethene		<1.0	<1.0
trans-1,3-Dichloropropene		<1.0	<1.0
Trichloroethene (TCE)		**18**	**17**
Trichlorofluoromethane		<1.0	<1.0
Vinyl chloride		<2.0	<2.0
Xylenes, Total		<1.0	<1.0
Surrogate (%)	**Limit**		
1,2-Dichloroethane-d4	70 - 130	107	95
1-Bromo-4-fluorobenzene	70 - 130	92	78
Toluene-D8	70 - 130	108	93

µg/l micrograms per liter.
Bold Bolded result indicates positively identified compound.
J Data are estimated due to associated quality control data.
T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.
UJ Potential low bias, possible false negative.

TABLE B-1

VOLATILE ORGANIC COMPOUNDS SAMPLE DATA SUMMARY
MAY 2005
SWMU 2-TOOELE ARMY DEPOT, UTAH

Location Identification		E-11	E-12
Field Sample Identification		TEAD-05-05-E11-WF	TEAD-11-05-05-E12-WF
Analyte/Methods (Units)	**Date Collected**	**5/12/2005**	**5/11/2005**
Volatile Organic Compounds/SW8260B (µg/l)			
1,1,1-Trichloroethane		<1.0	<1.0
1,1,2,2-Tetrachloroethane		<1.0	<1.0
1,1,2-Trichloroethane		<1.0	<1.0
1,1-Dichloroethane		<1.0	<1.0
1,1-Dichloroethene		<1.0	<1.0
1,2-Dichlorobenzene		<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0
1,3-Dichlorobenzene		<1.0	<1.0
1,4-Dichlorobenzene		<1.0	<1.0
Benzene		<1.0	<1.0
Bromodichloromethane		<1.0	<1.0
Bromoform		<1.0	<1.0
Bromomethane		<1.0	<1.0
Carbon tetrachloride		<1.0	<1.0
Chlorobenzene		<1.0	<1.0
Chloroethane		<1.0	<1.0
Chloroform		<1.0	<1.0
Chloromethane		<2.0	<2.0
cis-1,3-Dichloropropene		<1.0	<1.0
Dibromochloromethane		<1.0	<1.0
Dichlorodifluoromethane		<1.0	<1.0
Ethylbenzene		<1.0	<1.0
Methylene chloride		<5.0	<5.0
Tetrachloroethene (PCE)		<1.0	<1.0
Toluene		<1.0	<1.0
Total 1,2-Dichloroethene		<1.0	<1.0
trans-1,3-Dichloropropene		<1.0	<1.0
Trichloroethene (TCE)		**8.0**	<1.0
Trichlorofluoromethane		<1.0	<1.0
Vinyl chloride		<2.0	<2.0
Xylenes, Total		<1.0	<1.0
Surrogate (%)	**Limit**		
1,2-Dichloroethane-d4	70 - 130	109	114
1-Bromo-4-fluorobenzene	70 - 130	99	100
Toluene-D8	70 - 130	98	97

µg/l micrograms per liter.
Bold Bolded result indicates positively identified compound.
J Data are estimated due to associated quality control data.
T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.
UJ Potential low bias, possible false negative.

TABLE B-1

VOLATILE ORGANIC COMPOUNDS SAMPLE DATA SUMMARY
MAY 2005
SWMU 2-TOOELE ARMY DEPOT, UTAH

Location Identification		E-13	E-14
Field Sample Identification		TEAD-05-05-E13-WF	TEAD-05-05-E14-WF
Analyte/Methods (Units)	**Date Collected**	**5/12/2005**	**5/12/2005**
Volatile Organic Compounds/SW8260B (µg/l)			
1,1,1-Trichloroethane		<1.0	<1.0
1,1,2,2-Tetrachloroethane		<1.0	<1.0
1,1,2-Trichloroethane		<1.0	<1.0
1,1-Dichloroethane		<1.0	<1.0
1,1-Dichloroethene		<1.0	<1.0
1,2-Dichlorobenzene		<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0
1,3-Dichlorobenzene		<1.0	<1.0
1,4-Dichlorobenzene		<1.0	<1.0
Benzene		<1.0	<1.0
Bromodichloromethane		<1.0	<1.0
Bromoform		<1.0	<1.0
Bromomethane		<1.0	<1.0
Carbon tetrachloride		<1.0	<1.0
Chlorobenzene		<1.0	<1.0
Chloroethane		<1.0	<1.0
Chloroform		<1.0	<1.0
Chloromethane		<2.0	<2.0
cis-1,3-Dichloropropene		<1.0	<1.0
Dibromochloromethane		<1.0	<1.0
Dichlorodifluoromethane		<1.0	<1.0
Ethylbenzene		<1.0	<1.0
Methylene chloride		<5.0	<5.0
Tetrachloroethene (PCE)		<1.0	<1.0
Toluene		<1.0	<1.0
Total 1,2-Dichloroethene		<1.0	<1.0
trans-1,3-Dichloropropene		<1.0	<1.0
Trichloroethene (TCE)		**3.1**	**18**
Trichlorofluoromethane		<1.0	<1.0
Vinyl chloride		<2.0	<2.0
Xylenes, Total		<1.0	<1.0
Surrogate (%)	**Limit**		
1,2-Dichloroethane-d4	70 - 130	108	104
1-Bromo-4-fluorobenzene	70 - 130	104	106
Toluene-D8	70 - 130	99	102

µg/l micrograms per liter.
Bold Bolded result indicates positively identified compound.
J Data are estimated due to associated quality control data.
T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.
UJ Potential low bias, possible false negative.

TABLE B-1

VOLATILE ORGANIC COMPOUNDS SAMPLE DATA SUMMARY
MAY 2005
SWMU 2-TOOELE ARMY DEPOT, UTAH

Location Identification		E-15	EFF
Field Sample Identification		TEAD-05-05-E15-WF	TEAD-05-05-EFF-WF
Analyte/Methods (Units)	**Date Collected**	**5/12/2005**	**5/12/2005**
Volatile Organic Compounds/SW8260B (µg/l)			
1,1,1-Trichloroethane		<1.0	<1.0
1,1,2,2-Tetrachloroethane		<1.0	<1.0
1,1,2-Trichloroethane		<1.0	<1.0
1,1-Dichloroethane		<1.0	<1.0
1,1-Dichloroethene		<1.0	<1.0
1,2-Dichlorobenzene		<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0
1,3-Dichlorobenzene		<1.0	<1.0
1,4-Dichlorobenzene		<1.0	<1.0
Benzene		<1.0	<1.0
Bromodichloromethane		<1.0	<1.0
Bromoform		<1.0	<1.0
Bromomethane		<1.0	<1.0
Carbon tetrachloride		<1.0	<1.0
Chlorobenzene		<1.0	<1.0
Chloroethane		<1.0	<1.0
Chloroform		<1.0	<1.0
Chloromethane		<2.0	<2.0
cis-1,3-Dichloropropene		<1.0	<1.0
Dibromochloromethane		<1.0	<1.0
Dichlorodifluoromethane		<1.0	<1.0
Ethylbenzene		<1.0	<1.0
Methylene chloride		<5.0	<5.0
Tetrachloroethene (PCE)		<1.0	<1.0
Toluene		<1.0	<1.0
Total 1,2-Dichloroethene		<1.0	<1.0
trans-1,3-Dichloropropene		<1.0	<1.0
Trichloroethene (TCE)		**1.6**	<1.0
Trichlorofluoromethane		<1.0	<1.0
Vinyl chloride		<2.0	<2.0
Xylenes, Total		<1.0	<1.0
Surrogate (%)	**Limit**		
1,2-Dichloroethane-d4	70 - 130	111	109
1-Bromo-4-fluorobenzene	70 - 130	104	106
Toluene-D8	70 - 130	102	101

µg/l micrograms per liter.
Bold Bolded result indicates positively identified compound.
J Data are estimated due to associated quality control data.
T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.
UJ Potential low bias, possible false negative.

TABLE B-1

VOLATILE ORGANIC COMPOUNDS SAMPLE DATA SUMMARY
MAY 2005
SWMU 2-TOOELE ARMY DEPOT, UTAH

Location Identification		INF
Field Sample Identification		TEAD-05-05-INF-WF
Analyte/Methods (Units)	**Date Collected**	**5/12/2005**
Volatile Organic Compounds/SW8260B (µg/l)		
1,1,1-Trichloroethane		<1.0
1,1,2,2-Tetrachloroethane		<1.0 UJ
1,1,2-Trichloroethane		<1.0
1,1-Dichloroethane		<1.0
1,1-Dichloroethene		<1.0
1,2-Dichlorobenzene		<1.0
1,2-Dichloroethane		<1.0
1,2-Dichloropropane		<1.0
1,3-Dichlorobenzene		<1.0
1,4-Dichlorobenzene		<1.0
Benzene		<1.0
Bromodichloromethane		<1.0
Bromoform		<1.0
Bromomethane		<1.0
Carbon tetrachloride		<1.0
Chlorobenzene		<1.0
Chloroethane		<1.0
Chloroform		<1.0
Chloromethane		<2.0
cis-1,3-Dichloropropene		<1.0
Dibromochloromethane		<1.0
Dichlorodifluoromethane		<1.0
Ethylbenzene		<1.0
Methylene chloride		<5.0
Tetrachloroethene (PCE)		<1.0
Toluene		<1.0
Total 1,2-Dichloroethene		<1.0
trans-1,3-Dichloropropene		<1.0
Trichloroethene (TCE)		**6.2 J**
Trichlorofluoromethane		<1.0
Vinyl chloride		<2.0
Xylenes, Total		<1.0
Surrogate (%)	**Limit**	
1,2-Dichloroethane-d4	70 - 130	89
1-Bromo-4-fluorobenzene	70 - 130	89
Toluene-D8	70 - 130	98

µg/l micrograms per liter.
Bold Bolded result indicates positively identified compound.
J Data are estimated due to associated quality control data.
T Analyte was positively identified but the reported concentration is estimat
concentration is less than the reporting limit, but greater than the method
UJ Potential low bias, possible false negative.

TABLE B-2

SUMMARY OF QUALIFED DATA
MAY 2005
SWMU2-TOOELE ARMY DEPOT, UTAH
(Page 1 of 1)

Field Sample Identification	Sample Date	Analysis Method	Analyte	Sample Result	Units	QC Type	QC Result	QC Limit	Bias	Added Flag	Comment
TEAD-05-05-INF-WF	05/12/05	SW8260B	1,1,2,2-Tetrachloroethane	<1.0	µg/l	CVS	29.9%	±25%	Low	UJ	Reporting limit is estimated. CVS %D below acceptance criterion, indicating a potential low bias.
TEAD-05-05-INF-WF	05/12/05	SW8260B	Trichloroethene (TCE)	6.2	µg/l	LCS	123%	80-120%	High	J	Datum is estimated, potentially biased high. LCS recovery above acceptance criterion.
TEAD-11-05-05-E2.1-WF	05/11/05	SW8260B	1,1-Dichloroethene	<1.0	µg/l	LCS	79%	80-120%	Low	UJ	Reporting limit is estimated. LCS recovery below acceptance criterion, indicating a potential low bias.
TEAD-11-05-05-E2.1-WF	05/11/05	SW8260B	Benzene	<1.0	µg/l	LCS	78%	80-120%	Low	UJ	Reporting limit is estimated. LCS recovery below acceptance criterion, indicating a potential low bias.
TEAD-11-05-05-E2-2-WF	05/11/05	SW8260B	1,1-Dichloroethene	<1.0	µg/l	LCS	79%	80-120%	Low	UJ	Reporting limit is estimated. LCS recovery below acceptance criterion, indicating a potential low bias.
TEAD-11-05-05-E2-2-WF	05/11/05	SW8260B	Benzene	<1.0	µg/l	LCS	78%	80-120%	Low	UJ	Reporting limit is estimated. LCS recovery below acceptance criterion, indicating a potential low bias.
TEAD-11-05-05-S-E2-2-WF	05/11/05	SW8260B	1,1-Dichloroethene	<1.0	µg/l	LCS	79%	80-120%	Low	UJ	Reporting limit is estimated. LCS recovery below acceptance criterion, indicating a potential low bias.
TEAD-11-05-05-S-E2-2-WF	05/11/05	SW8260B	Benzene	<1.0	µg/l	LCS	78%	80-120%	Low	UJ	Reporting limit is estimated. LCS recovery below acceptance criterion, indicating a potential low bias.

T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.
D Sample dilution required for analysis; reported values reflect the dilution.
CVS Calibration verification standard
LCS Laboratory control sample
LCD Laboratory control sample duplicate
SURR Surrogate
%D Percent difference

TABLE B-3

SAMPLE PREPARATION BATCH SUMMARY
MAY 2005
SWMU 2-TOOELE ARMY DEPOT, UTAH
(Page 1 of 2)

Location Identification	Field Sample Identification	Sample Date	Sample Type	Laboratory Identification	Preparation Lot	Preparation Method	Preparation Date	Analytical Method	Analytical Date
LABQC	VO01E25Q	NA	MB	VO01E25Q	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
LABQC	VO01E25L	NA	LCS	VO01E25L	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
LABQC	VO01E25C	NA	LCD	VO01E25C	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
E-11	TEAD-05-05-E11-WF	05/12/05	N	E112-08N	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
E-01	TEAD-05-05-E1-WF	05/12/05	N	E112-09N	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
E-12	TEAD-11-05-05-E12-WF	05/11/05	N	E090-11R	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
E-12	TEAD-11-05-05-E12-WF	05/11/05	MS	E090-11U	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
E-12	TEAD-11-05-05-E12-WF	05/11/05	MSD	E090-11V	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
LABQC	VO94E10Q	NA	MB	VO94E10Q	VO94E10	SW5030B	05/18/05	SW8260B	05/18/05
LABQC	VO94E10L	NA	LCS	VO94E10L	VO94E10	SW5030B	05/18/05	SW8260B	05/18/05
LABQC	VO94E10C	NA	LCD	VO94E10C	VO94E10	SW5030B	05/18/05	SW8260B	05/18/05
EFF	TEAD-05-05-EFF-WF	05/12/05	N	E112-11	VO94E10	SW5030B	05/18/05	SW8260B	05/18/05
FIELDQC	120505TB01	05/12/05	TB	E112-01	VO94E10	SW5030B	05/18/05	SW8260B	05/18/05
LABQC	VO94E12Q	NA	MB	VO94E12Q	VO94E12	SW5030B	05/19/05	SW8260B	05/19/05
LABQC	VO94E12L	NA	LCS	VO94E12L	VO94E12	SW5030B	05/19/05	SW8260B	05/19/05
LABQC	VO94E12C	NA	LCD	VO94E12C	VO94E12	SW5030B	05/19/05	SW8260B	05/19/05
E-13	TEAD-05-05-E13-WF	05/12/05	N	E112-02R	VO94E12	SW5030B	05/19/05	SW8260B	05/19/05
E-14	TEAD-05-05-E14-WF	05/12/05	N	E112-03R	VO94E12	SW5030B	05/19/05	SW8260B	05/19/05
E-15	TEAD-05-05-E15-WF	05/12/05	N	E112-07R	VO94E12	SW5030B	05/19/05	SW8260B	05/19/05
LABQC	VO94E15Q	NA	MB	VO94E15Q	VO94E15	SW5030B	05/20/05	SW8260B	05/20/05
LABQC	VO94E15L	NA	LCS	VO94E15L	VO94E15	SW5030B	05/20/05	SW8260B	05/20/05
LABQC	VO94E15C	NA	LCD	VO94E15C	VO94E15	SW5030B	05/20/05	SW8260B	05/20/05
INF	TEAD-05-05-INF-WF	05/12/05	N	E112-10N	VO94E15	SW5030B	05/20/05	SW8260B	05/20/05
FIELDQC	TEAD-11-05-05-TB-01	05/11/05	TB	E090-01	VO94E15	SW5030B	05/20/05	SW8260B	05/20/05

TABLE B-3

SAMPLE PREPARATION BATCH SUMMARY
MAY 2005
SWMU 2-TOOELE ARMY DEPOT, UTAH

Location Identification	Field Sample Identification	Sample Date	Sample Type	Laboratory Identification	Preparation Lot	Preparation Method	Preparation Date	Analytical Method	Analytical Date
LABQC	VO94E16Q	NA	MB	VO94E16Q	VO94E16	SW5030B	05/20/05	SW8260B	05/20/05
LABQC	VO94E16L	NA	LCS	VO94E16L	VO94E16	SW5030B	05/20/05	SW8260B	05/20/05
LABQC	VO94E16C	NA	LCD	VO94E16C	VO94E16	SW5030B	05/20/05	SW8260B	05/20/05
E-02-1	TEAD-11-05-05-E2.1-WF	05/11/05	N	E090-10	VO94E16	SW5030B	05/21/05	SW8260B	05/21/05
E-02-2	TEAD-11-05-05-E2-2-WF	05/11/05	N	E090-08	VO94E16	SW5030B	05/20/05	SW8260B	05/20/05
E-02-2	TEAD-11-05-05-S-E2-2-WF	05/11/05	FD	E090-09	VO94E16	SW5030B	05/20/05	SW8260B	05/20/05

FD	Field duplicate.	MB	Method blank.	N	Investigative sample.
LCD	Laboratory control sample duplicate.	MS	Matrix spike.	TB	Trip blank.
LCS	Laboratory control sample.	MSD	Matrix spike duplicate.		

TABLE B-4

HOLDING TIME SUMMARY
SWMU 2, MAY 2005 QUARTERLY SAMPLING
TOOELE ARMY DEPOT, UTAH
(Page 1 of 1)

Location Identification	Field Sample Identification	Laboratory Identification	Sample Date	Analysis Method	Preparation Date	Analysis Date	Analysis Holding Time	Method Holding Time
E-01	TEAD-05-05-E1-WF	E112-09N	05/12/05	SW8260B	05/23/05	05/23/05	11	14
E-02-1	TEAD-11-05-05-E2.1-WF	E090-10	05/11/05	SW8260B	05/21/05	05/21/05	10	14
E-02-2	TEAD-11-05-05-E2-2-WF	E090-08	05/11/05	SW8260B	05/20/05	05/20/05	9	14
E-02-2	TEAD-11-05-05-S-E2-2-WF	E090-09	05/11/05	SW8260B	05/20/05	05/20/05	9	14
E-11	TEAD-05-05-E11-WF	E112-08N	05/12/05	SW8260B	05/23/05	05/23/05	11	14
E-12	TEAD-11-05-05-E12-WF	E090-11R	05/11/05	SW8260B	05/23/05	05/23/05	12	14
E-13	TEAD-05-05-E13-WF	E112-02R	05/12/05	SW8260B	05/19/05	05/19/05	7	14
E-14	TEAD-05-05-E14-WF	E112-03R	05/12/05	SW8260B	05/19/05	05/19/05	7	14
E-15	TEAD-05-05-E15-WF	E112-07R	05/12/05	SW8260B	05/19/05	05/19/05	7	14
EFF	TEAD-05-05-EFF-WF	E112-11	05/12/05	SW8260B	05/18/05	05/18/05	6	14
FIELDQC	120505TB01	E112-01	05/12/05	SW8260B	05/18/05	05/18/05	6	14
FIELDQC	TEAD-11-05-05-TB-01	E090-01	05/11/05	SW8260B	05/20/05	05/20/05	9	14
INF	TEAD-05-05-INF-WF	E112-10N	05/12/05	SW8260B	05/20/05	05/20/05	8	14

TABLE B-5

METHOD BLANK DATA SUMMARY
SWMU 2, MAY 2005 QUARTERLY SAMPLING
TOOELE ARMY DEPOT, UTAH
(Page 1 of 1)

Analyte (Units)	Lab Sample Identification / Extraction Code / Extraction Date / Analysis Code / Analysis Date	VO94E10Q SW5030B 5/18/2005 SW8260B 5/18/2005	VO94E12Q SW5030B 5/19/2005 SW8260B 5/19/2005	VO94E15Q SW5030B 5/20/2005 SW8260B 5/20/2005	VO94E16Q SW5030B 5/20/2005 SW8260B 5/20/2005	VO01E25Q SW5030B 5/23/2005 SW8260B 5/23/2005
Volatile Organic Compounds (µg/l)						
1,1,1-Trichloroethane		<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane		<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane		<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane		<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene		<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene		<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene		<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene		<1.0	<1.0	<1.0	<1.0	<1.0
Benzene		<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane		<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform		<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane		<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride		<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene		<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane		<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform		<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane		<2.0	<2.0	<2.0	<2.0	<2.0
cis-1,3-Dichloropropene		<1.0	<1.0	<1.0	<1.0	<1.0
Dibromochloromethane		<1.0	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane		<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene		<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride		<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene (PCE)		<1.0	<1.0	<1.0	<1.0	<1.0
Toluene		<1.0	<1.0	<1.0	<1.0	<1.0
Total 1,2-Dichloroethene		<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene		<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene (TCE)		<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane		<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride		<2.0	<2.0	<2.0	<2.0	<2.0
Xylenes, Total		<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate (%)	**Limit**					
1,2-Dichloroethane-d4	70 - 130	113	110	96	97	107
1-Bromo-4-fluorobenzene	70 - 130	114	102	83	83	101
Toluene-D8	70 - 130	112	106	98	98	97

µg/l micrograms per liter.

TABLE B-6

TRIP BLANK DATA SUMMARY
SWMU 2, MAY 2005 QUARTERLY SAMPLING
TOOELE ARMY DEPOT, UTAH
(Page 1 of 1)

Field Sample Identification		TEAD-11-05-05-TB-01	120505TB01
Date Collected		5/11/2005	5/12/2005
Analyte/Methods (Units)			
Volatile Organic Compounds/SW8260B (µg/l)			
1,1,1-Trichloroethane		<1.0	<1.0
1,1,2,2-Tetrachloroethane		<1.0 UJ	<1.0
1,1,2-Trichloroethane		<1.0	<1.0
1,1-Dichloroethane		<1.0	<1.0
1,1-Dichloroethene		<1.0	<1.0
1,2-Dichlorobenzene		<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0
1,3-Dichlorobenzene		<1.0	<1.0
1,4-Dichlorobenzene		<1.0	<1.0
Benzene		<1.0	<1.0
Bromodichloromethane		<1.0	<1.0
Bromoform		<1.0	<1.0
Bromomethane		<1.0	<1.0
Carbon tetrachloride		<1.0	<1.0
Chlorobenzene		<1.0	<1.0
Chloroethane		<1.0	<1.0
Chloroform		<1.0	<1.0
Chloromethane		<2.0	<2.0
cis-1,3-Dichloropropene		<1.0	<1.0
Dibromochloromethane		<1.0	<1.0
Dichlorodifluoromethane		<1.0	<1.0
Ethylbenzene		<1.0	<1.0
Methylene chloride		<5.0	<5.0
Tetrachloroethene (PCE)		<1.0	<1.0
Toluene		<1.0	<1.0
Total 1,2-Dichloroethene		<1.0	<1.0
trans-1,3-Dichloropropene		<1.0	<1.0
Trichloroethene (TCE)		<1.0	<1.0
Trichlorofluoromethane		<1.0	<1.0
Vinyl chloride		<2.0	<2.0
Xylenes, Total		<1.0	<1.0
Surrogate (%)	**Limit**		
1,2-Dichloroethane-d4	70 - 130	90	107
1-Bromo-4-fluorobenzene	70 - 130	79	104
Toluene-D8	70 - 130	86	105

µg/l micrograms per liter.
UJ Potential low bias, possible false negative.

TABLE B-7

FIELD DUPLICATE DATA SUMMARY
SWMU 2, MAY 2005 QUARTERLY SAMPLING
TOOELE ARMY DEPOT, UTAH
(Page 1 of 1)

Location Identification		E-02-2	E-02-2 Dup	
Field Sample Identification		TEAD-11-05-05-E2-2-WF	TEAD-11-05-05-S-E2-2-WF	
Sample Type		Parent	Field Duplicate	
Analyte/Methods (Units)	**Date Collected**	**5/11/2005**	**5/11/2005**	**RPD**
Volatile Organic Compounds/SW8260B (µg/l)				
1,1,1-Trichloroethane		<1.0	<1.0	NC
1,1,2,2-Tetrachloroethane		<1.0	<1.0	NC
1,1,2-Trichloroethane		<1.0	<1.0	NC
1,1-Dichloroethane		**0.22 T**	<1.0	NC
1,1-Dichloroethene		<1.0 UJ	<1.0 UJ	NC
1,2-Dichlorobenzene		<1.0	<1.0	NC
1,2-Dichloroethane		<1.0	<1.0	NC
1,2-Dichloropropane		<1.0	<1.0	NC
1,3-Dichlorobenzene		<1.0	<1.0	NC
1,4-Dichlorobenzene		<1.0	<1.0	NC
Benzene		<1.0 UJ	<1.0 UJ	NC
Bromodichloromethane		<1.0	<1.0	NC
Bromoform		<1.0	<1.0	NC
Bromomethane		<1.0	<1.0	NC
Carbon tetrachloride		**0.58 T**	**0.49 T**	16.82
Chlorobenzene		<1.0	<1.0	NC
Chloroethane		<1.0	<1.0	NC
Chloroform		<1.0	<1.0	NC
Chloromethane		<2.0	<2.0	NC
cis-1,3-Dichloropropene		<1.0	<1.0	NC
Dibromochloromethane		<1.0	<1.0	NC
Dichlorodifluoromethane		<1.0	<1.0	NC
Ethylbenzene		<1.0	<1.0	NC
Methylene chloride		<5.0	<5.0	NC
Tetrachloroethene (PCE)		<1.0	<1.0	NC
Toluene		<1.0	<1.0	NC
Total 1,2-Dichloroethene		<1.0	<1.0	NC
trans-1,3-Dichloropropene		<1.0	<1.0	NC
Trichloroethene (TCE)		**18**	**17**	5.71
Trichlorofluoromethane		<1.0	<1.0	NC
Vinyl chloride		<2.0	<2.0	NC
Xylenes, Total		<1.0	<1.0	NC
Surrogate (%)	**Limit**			
1,2-Dichloroethane-d4	70 - 130	107	95	11.88
1-Bromo-4-fluorobenzene	70 - 130	92	78	16.47
Toluene-D8	70 - 130	108	93	14.93

µg/l micrograms per liter.
Bold Bolded result indicates positively identified compound.
NC Not calculated.
T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.
UJ Potential low bias, possible false negative.
RPD Relative percent difference.

TABLE B-8

MATRIX SPIKE / MATRIX SPIKE DUPLICATE DATA SUMMARY
SWMU 2, MAY 2005 QUARTERLY SAMPLING
TOOELE ARMY DEPOT, UTAH
(Page 1 of 1)

Analyte/Methods (Units)	Location Identification / Field Sample Identification / Sample Type / Date Collected	E-12 TEAD-11-05-05-E12-WF Parent 5/11/2005	E-12 TEAD-11-05-05-E12-WF Matrix Spike 5/11/2005	E-12 TEAD-11-05-05-E12-WF Spike Duplicate 5/11/2005	RPD
Volatile Organic Compounds/ SW8260B (µg/l)	**Limit**				
1,1-Dichloroethene	70 - 130	<1.0	91	85	6.82
Benzene	70 - 130	<1.0	93	90	3.28
Chlorobenzene	70 - 130	<1.0	97	94	3.14
Toluene	70 - 130	<1.0	95	91	4.30
Trichloroethene (TCE)	70 - 130	<1.0	95	91	4.30
Surrogate (%)					
1,2-Dichloroethane-d4	70 - 130	114	112	112	0.00
1-Bromo-4-fluorobenzene	70 - 130	100	96	95	1.05
Toluene-D8	70 - 130	97	101	102	0.99

µg/l micrograms per liter.

RPD Relative percent difference.

TABLE B-9

LABORATORY CONTROL SAMPLE / LABORATORY DUPLICATE SAMPLE DATA SUMMARY
SWMU 2, MAY 2005 QUARTERLY SAMPLING
TOOELE ARMY DEPOT, UTAH
(Page 1 of 2)

Analyte (Units)	Lab Sample Identification / Sample Type / Extraction Code / Extraction Date / Analysis Code / Analysis Date	VO94E10L LCS SW5030B 5/18/2005 SW8260B 5/18/2005	VO94E10C LCD SW5030B 5/18/2005 SW8260B 5/18/2005	VO94E12L LCS SW5030B 5/19/2005 SW8260B 5/19/2005	VO94E12C LCD SW5030B 5/19/2005 SW8260B 5/19/2005	VO94E15L LCS SW5030B 5/20/2005 SW8260B 5/20/2005
Volatile Organic Compounds (%)	**Limit**					
1,1-Dichloroethene	80 - 120	83	86	89	94	84
Benzene	80 - 120	85	87	92	96	88
Chlorobenzene	80 - 120	91	93	93	100	105
Toluene	80 - 120	90	93	95	99	97
Trichloroethene (TCE)	80 - 120	95	99	102	106	114
Surrogate (%)						
1,2-Dichloroethane-d4	70 - 130	95	104	106	103	98
1-Bromo-4-fluorobenzene	70 - 130	97	**138**	105	99	87
Toluene-D8	70 - 130	97	105	109	108	95

Bold Bolded and underlined result indicates quality control data outside acceptance criteria.
LCS Laboratory control sample.
LCD Laboratory control duplicate.

TABLE B-9

LABORATORY CONTROL SAMPLE / LABORATORY DUPLICATE SAMPLE DATA SUMMARY
SWMU 2, MAY 2005 QUARTERLY SAMPLING
TOOELE ARMY DEPOT, UTAH
(Page 2 of 2)

Analyte (Units)	Lab Sample Identification / Sample Type / Extraction Code / Extraction Date / Analysis Code / Analysis Date	VO94E15C LCD SW5030B 5/20/2005 SW8260B 5/20/2005	VO94E16L LCS SW5030B 5/20/2005 SW8260B 5/20/2005	VO94E16C LCD SW5030B 5/20/2005 SW8260B 5/20/2005	VO01E25L LCS SW5030B 5/23/2005 SW8260B 5/23/2005	VO01E25C LCD SW5030B 5/23/2005 SW8260B 5/23/2005
Volatile Organic Compounds (%)	**Limit**					
1,1-Dichloroethene	80 - 120	89	**79**	82	88	83
Benzene	80 - 120	94	**78**	80	101	95
Chlorobenzene	80 - 120	110	95	93	104	102
Toluene	80 - 120	104	87	87	102	97
Trichloroethene (TCE)	80 - 120	**123**	100	104	102	98
Surrogate (%)						
1,2-Dichloroethane-d4	70 - 130	95	96	93	113	111
1-Bromo-4-fluorobenzene	70 - 130	83	86	82	97	96
Toluene-D8	70 - 130	100	91	95	100	100

Bold Bolded and underlined result indicates quality control data outside acceptance criteria.
LCS Laboratory control sample.
LCD Laboratory control duplicate.